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San Francisco — June 15-19

May 15, 1925
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Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

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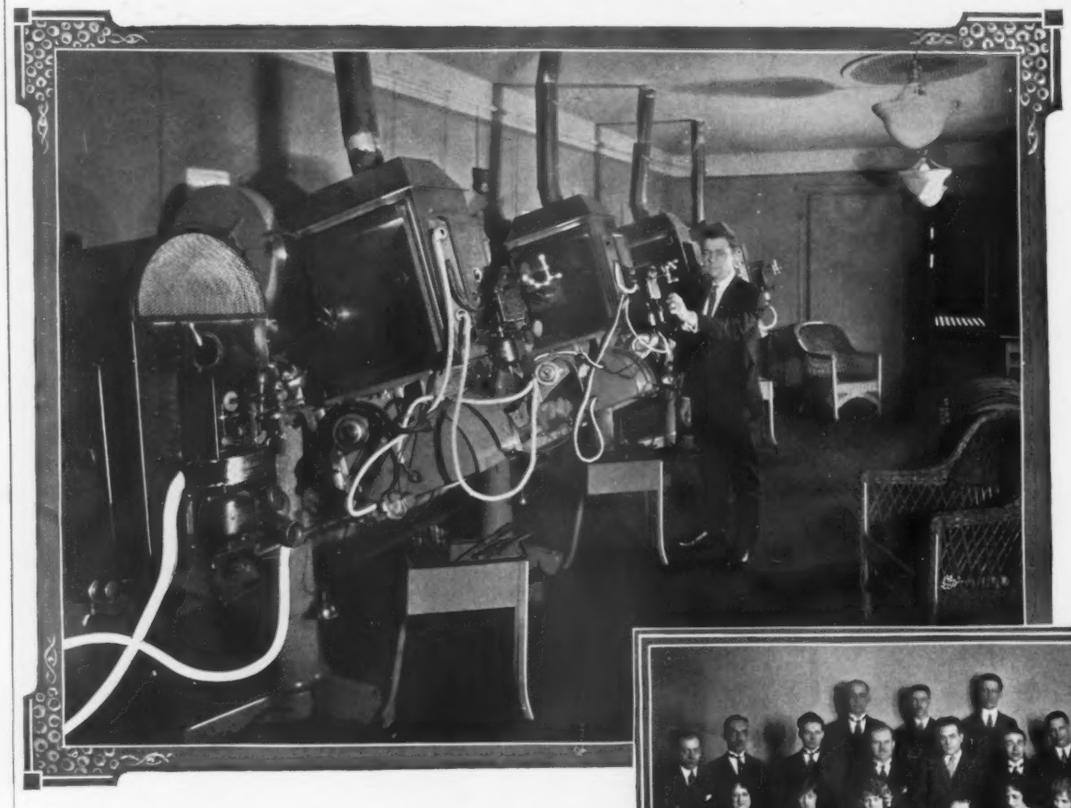

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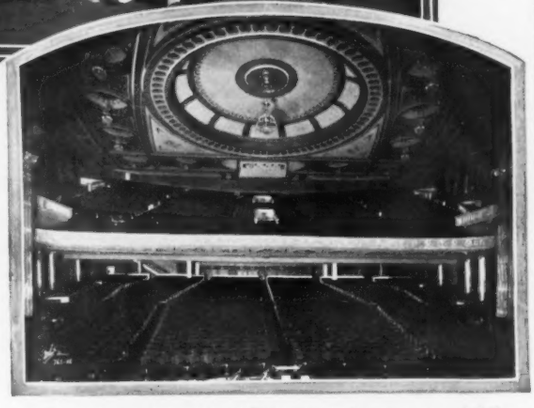

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Journal of Electricity

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IN THE ELEVEN WESTERN STATES

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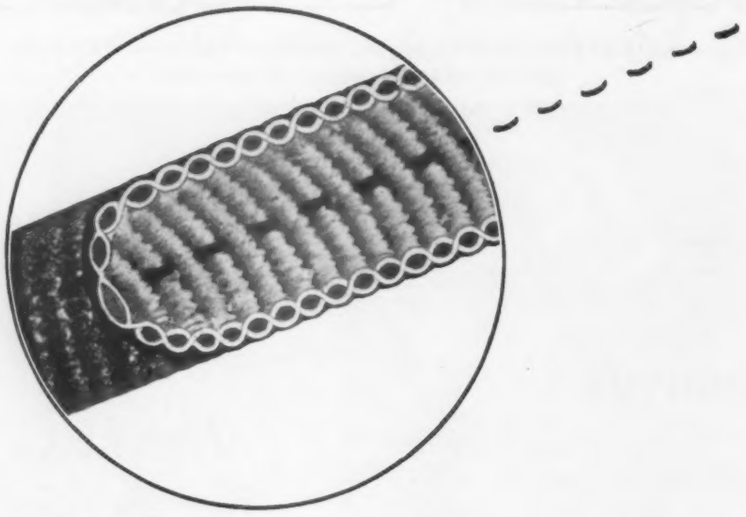
The P. C. E. A. Membership Drive

A MATTER worthy of attention by men who expect to attend the N.E.L.A. convention, is this: a drive for additional membership in the Pacific Coast Electrical Association has just been inaugurated. The cost of a Class "B" membership, that is, the type of membership open to employees of member companies, is only $3 per year. The annual proceedings furnished free to members is worth more than that alone, to say nothing of the many other considerations and privileges of membership. While admission to the various functions and sessions at the Auditorium will not be confined to members exclusively, it should be pointed out that while Class "B" membership costs but $3 per year a registration fee of $5 will be charged to all non-members. It does not require a Scotch ancestry to determine the advantages of membership under the conditions cited above, nor should it require any further comment to emphasize the responsibility of every member of the electrical industry on the Pacific Coast, especially in California, their obligation as hosts, and the desirability of bringing about a record attendance at all convention meetings. A $3 membership in the Pacific Coast Electrical Association carries with it membership in the N.E.L.A. at no additional cost, and with all the rights and privileges involved in such membership. There should be at least 1,000 new members between now and the first of June.



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EDITORIAL

Beautification of Properties as a Phase of Public Relations

AT a recent meeting of a committee of the Northwest Electric Light and Power Association to discuss public relations, the question of the beautification of grounds around stations and structures was brought up. All present agreed that properties should be kept clean, neat, painted, and beautified with grass, shrubs and flowers. Many examples of favorable reactions by the general public were cited by the committeemen in relating personal experiences. Of these probably the most spectacular was the case of a customer of the Pacific Power & Light Company who bought a block of stock largely because he felt that a company that kept its buildings and grounds well groomed must be a safe one in which to invest. The committee was unanimous in approval of the idea, which is not a new one among utility companies of the West, and agreed that here, where nature has been generous as to soil and climate, the problem is neither difficult nor expensive.

Closely allied to the specific subject of beautifying grounds is the question as to how far a power company should go in capital expenditure for purely decorative features of buildings. It is conceivable that in architectural embellishment one could go too far. Obviously a power house should not be modeled after the Parthenon in marble, even though it would be infinitely more beautiful than concrete, and perhaps outlast it. Power buildings should not look like Greek temples nor yet like subtreasuries of the United States, nor, in fact, like anything other than what they are; and, of course, since rates have a direct relation to investment, it is due the payers of the rates as well as to stockholders not to exceed the bounds of reason in embellishment.

First of all, the buildings should give an impression of permanence and solidity. Then, in accordance with their relation to their surroundings, they should be decorated to an extent that will create a favorable reaction in the minds of the people who see them. As a case in point, there is the new substation of the Puget Sound Power & Light Company to be erected in a residence district of Seattle. The architect's drawing shows that the building will have a proper appearance of solidity combined with suitable decoration, so that it will be an ornament to the district in which it is to stand. Inquiry discloses that the cost of this decoration will add less than 5 per cent to the total cost of the building, which would seem entirely within reason. It is probably true that each structure presents its own problem in this respect, since location has a direct bearing on the extent to which expenditure for ornamentation is warranted, but it would be interesting to know if anyone has thought enough about the general subject to have determined just what this percentage ought to be.

The Industry Should Preach the Doctrine of Electrical Safety

THE necessity of selling journeyman electricians and others in the industry the idea of the absolute safety of electricity for water heating and other heavy-duty applications in the home recently was brought to the attention of a member of the electrical fraternity in the San Francisco Bay district.

He had ordered an automatic electric water-heater installed by a responsible electrical contractor. Returning home after the installation had been made, he found that the journeyman who had done the work had told his wife to be very careful as the automatic feature was liable not to work and the tank might explode. He also implied that electric thermostats on water-heaters were not dependable.

These few remarks would have left the average housewife with a feeling of distrust about the safety of the device and would have destroyed a great deal of the pleasure to be obtained from its use. This would tend to retard the greater use of electricity in the home.

Electricity is the safest form of light, heat and power, and is so regarded by the National Board of Fire Underwriters. A correctly made device, properly installed, should be the essence of safety. All members of the industry must be brought to the realization of this fact if electricity is to be utilized to the fullest extent in the home.

The Contractor Is the Outlet of the Electrical Reservoir

THOSE of us who are not so old as to have forgotten our high school physics may remember that, regardless of the dimensions of the container, the size of the outlet regulates the quantity of flow therefrom, other conditions being equal. A reservoir containing 1,000,000 acre-feet of water will discharge no more water through a 1-in. pipe than a reservoir containing 1,000 acre-feet, if the head is the same.

The electrical industry is in very much the same situation, for, regardless of the great development of power plants, the concentrated energies and man-

ufacturing capacity of the great electrical industrial concerns and so on down to the established channels of distribution, the fact remains nevertheless that in many respects the electrical contractor is the neck of the bottle, the outlet from the great reservoir. If the contractor does an adequate job of house-wiring that provides for the maximum installation of appliances, the market for the manufacturer's goods and the market for the energy on sale by the central station is established. If, on the other hand, the contractor in his eagerness to get a job tries to cut and trim, leaves out this or makes something else smaller, he has helped to plug up the neck of the bottle through which the flow should be free and uninterrupted. Is it not, therefore, incumbent upon the rest of the industry to lend every possible support and assistance to the contractor in order that he may feel a real sense of his own responsibilities to the rest of the industry, and that the industry in turn may realize its responsibility to the contractor as well? The relationship is clear; the benefits of this relationship are mutual. The sword is two-edged; it cuts both ways. In fact, interdependability nowhere is emphasized more keenly than among the various branches of the electrical industry. Now that we have for the first time a nucleus in the statewide organization of electrical contractors in California under the auspices of the Electragists International, it behooves all of the rest of the industry to help in every way possible in getting this new cooperative enterprise firmly and permanently established.

An Opportunity to Learn "What's the Matter with the Electric Truck?"

IN a letter to the editor of one of our contemporaries a reader asks the question, "What's the matter with the electric truck?" He answers his own question with the accusation that indifference and lack of vision on the part of many of the utility executives is largely responsible for the slow progress to date in this important phase of central-station development. In the main this criticism is a little harsh, but there are some sections of the country where it will apply.

There are instances where sales departments are working industriously to build battery-charging load through cooperation with truck and battery manufacturers without proper recognition on the part of company executives. There are other instances where no thought at all is given to this class of load. And there are some instances—fortunately few in number—where the electric truck is looked upon with actual disapproval.

So far as the West is concerned, liittle has been done in the development of the electric truck except in California and Colorado. This has been largely due to lack of information rather than indifference. This situation promises to change as the result of a decision to hold an electric transportation school in San Francisco the week prior to the National Electric Light Association convention in June.

Arrangements have been made with Eastern truck and battery manufacturers and those contral stations which have had a wide experience in the development of electric truck business to send a corps of capable instructors to conduct the classes.

The school has been arranged for and sponsored by the transportation bureau of the Pacific Coast Electrical Association. This has been done in addition to the preparation of an excellent report on the progress and possibilities of developing a battery-charging load in California.

It behooves central-station executives in every section of the West to delegate men in their commercial department to attend the school and participate in the classwork. They are bound to bring home a new feeling of the importance and desirability of this load. And in this connection we might recommend that the executives themselves would be well repaid if they would spare sufficient time to attend the school.

Wood Poles Store Bird's Winter Supply of Food

WOODPECKERS, acorns and transmission line poles form a bad combination. On another page in this issue appears an item describing the damaging results of the persistent and successful efforts of this species of bird in using a wood pole for the storage of his winter food supply. On the face of it this is an amusing incident. However, it is proving to be expensive amusement, and as far as has been discovered to date there seems to be no effective way successfully to combat this nuisance.

Of course, the first thought to come to mind is the suggestion that the use of steel poles would obviate the difficulty. However, there are economic considerations which do not permit the expenditure necessary for steel poles, in the minds of the powers that be in this particular case. We are wondering whether or not some of the members of the electric-service fraternity will have something feasible to suggest other than the extermination of the bird.

Adequate Wiring Standards and the Red Seal Plan

INTEREST in the so-called Red Seal Plan is growing, the more familiar men of the industry become with its possibilities. In brief it affords a means of establishing adequate wiring standards for the home. What is meant by adequate? The answer to this question is that what may be regarded as adequate in Iowa would be ridiculously inadequate in California by reason of the greater development of electricity in that state. Adequate in a Californian sense means a system of wiring beginning with the meter that provides ways and means for the ultimate installation and use of every household electrical appliance. If the industry can be made to see the importance of this, a great element of sales resistance toward the increased use of household appliances will be removed. When a housewife discovers that in order to install a range she has not

merely to purchase the range itself but also to provide a considerable sum of money in addition for alterations in the wiring, it is difficult indeed to consummate the sale. It is gratifying to note the strong tendency throughout the industry toward the establishment of higher standards providing for better service to the user of electricity. Such moves are thoroughly constructive and should be supported in no half-hearted manner.

DISCUSSION

"Some Cat and Some Telephone Pole!" Comments a Telephone Company Reader

To the Editor:

Sir—I was much interested in the communication on page 197 of the March 15 issue of the Journal of Electricity entitled "Electro-Thermo Zoologist Required to Answer Questions Raised by Engineer," and particularly in the third line of the second paragraph of the newspaper item which formed a part of the story.

They must run hog-wild on joint construction back there in Knoxville! In this country it would have to be **some cat** that could stand on a telephone pole and carelessly move its tail so as to come in contact with 44,000 volts!

I would like to have added one more question to Mr. Letson Balliet's list and ask why it is every newspaperman refers to every pole as a "telephone pole?"

Lindsley W. Ross,
The Pacific Telephone and Telegraph Company.

Portland, Ore.
May 1, 1925.

Lawyers or Engineers—Both Hold Executive Positions

To the Editor:

Sir: I have read your April 1 edition of the Journal of Electricity, especially your second editorial on page 233, entitled, "Specialization and the Executives of the Future."

Please advise me regarding the following:

1. How many lawyers are paid subscribers to the Journal of Electricity?
2. How many engineers?
3. How many legal firms or corporations advertise in the Journal of Electricity?
4. How many engineering firms?

Warren H. McBryde,
Secretary California and Hawaiian Sugar Refining Corporation

San Francisco, Calif.
April 6, 1925.

It's Not the Education but the Man That Makes a Good Executive

To the Editor:

Sir—Your editorial in the April 1 issue, entitled "Specialization and the Executive of the Future," contains some misleading statments; statements which may be true but from which wrong conclusions are apt to be drawn.

When you advise all college men to study law that they may become executives, aren't you assuming that all men are fitted for and enjoy executive work? Aren't you also assuming that this executive ability can be educated into any college man? I note Mr. Masson's letter in the May 1 issue and I will give you another incident in connection with Eugene Grace that may illustrate my idea that some lawyers are executives not merely because they are lawyers but because they have executive ability. I recently met a man who was a classmate of Eugene Grace's. Both started to work for the Bethlehem Steel Corporation at the same time and in the same department. My acquaintance is a good engineer of a certain type but if you know him you realize why he isn't in Eugene Grace's place. He had the same education and start but —.

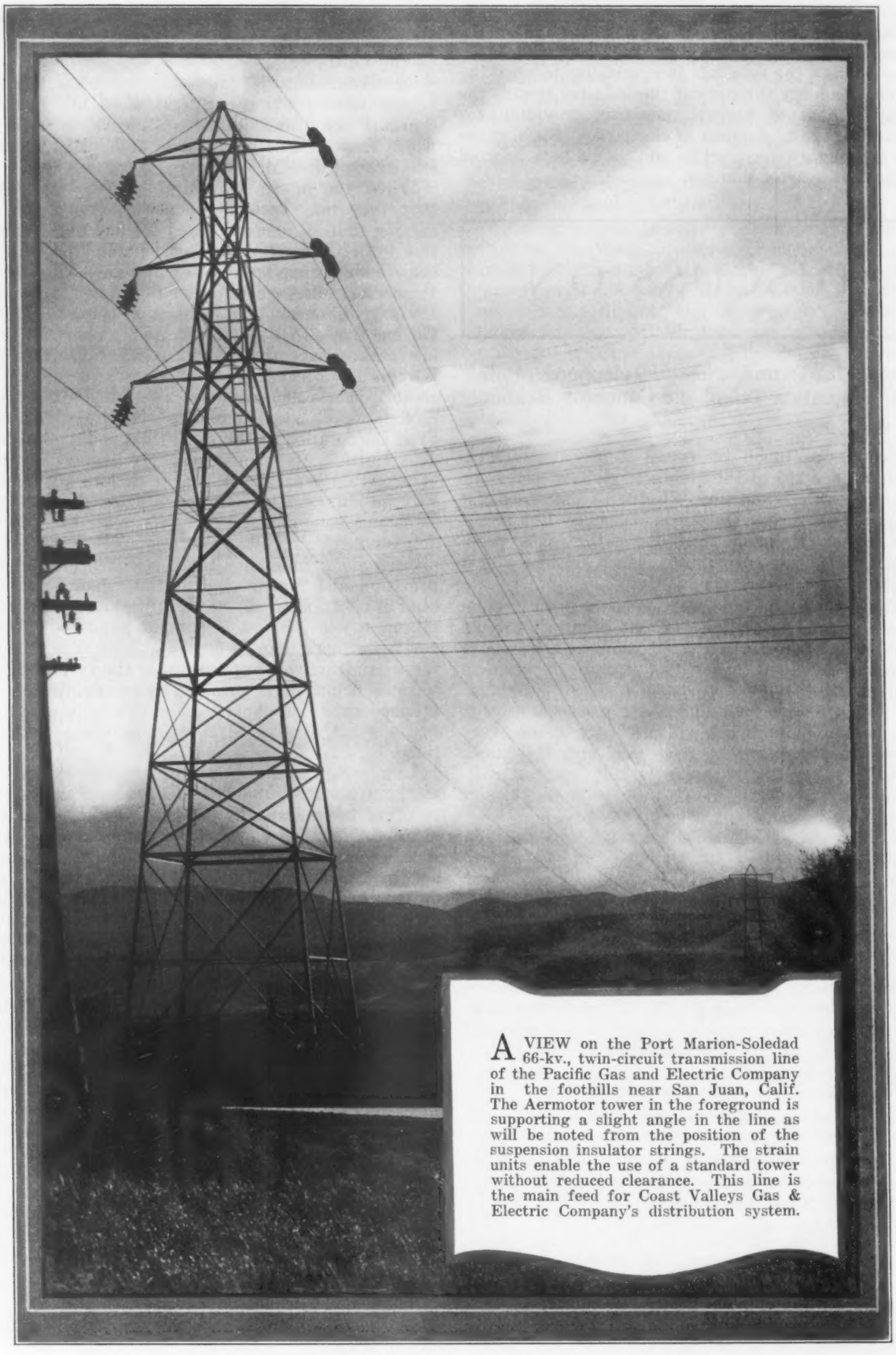
It has been suggested that engineering courses be divided along functional lines, research, design, supervision and management rather than along the lines of civil, electrical, etc. If this was done the engineer of executive ability might have that ability developed more than at present. Now it is unusual for a student who has executive ability and is interested primarily in men to choose engineering, he is more apt to study law. For this reason you do find a great number of lawyers in executive positions.

To any engineer who is dissatisfied with his profession I would say "Go out and tell your tale of woe to every lawyer and doctor and business man you can find. If you believe all you are told you will be sure, when you come back, that engineering is the only profession in the world with all advantages and no troubles." I believe that 90 per cent of the people think that their lack of progress is due to circumstances outside themselves. They think that were they only in some other profession, or location, or time or circumstance they would be world beaters. I believe most men are what they are mainly due to their own ability and energy and that the opportunities of life are pretty well distributed.

Furthermore your editorial gives the impression that the higher offices of industry are closed to engineers. I haven't any data on industry in general but I note that Julius Kruttschnitt states, in the May "Mechanical Engineering," that 34 per cent of the chairmen and 19 per cent of the presidents of the railroads of the United States are engineers. Our case is not so hopeless after all; the engineer who can not only design, build and operate things but who can also manage men and money will find plenty of opportunity to use that ability.

George L. Sullivan,
Dean, College of Engineering,
University of Santa Clara.

Santa Clara, Calif.,
May 6, 1925.



A VIEW on the Port Marion-Soledad 66-kv., twin-circuit transmission line of the Pacific Gas and Electric Company in the foothills near San Juan, Calif. The Aermotor tower in the foreground is supporting a slight angle in the line as will be noted from the position of the suspension insulator strings. The strain units enable the use of a standard tower without reduced clearance. This line is the main feed for Coast Valleys Gas & Electric Company's distribution system.

Commercial Possibilities of Color Flood-Lighting

By A. M. Frost

Power Sales Manager, San Joaquin Light & Power Corporation, Fresno, Calif.

DEEP-ROOTED in mankind is a love of light. It is an instinct as basic as life itself. It is an instinct found in the lowest organisms and on up to the highest. The primitive fisherman used a torch to bring his salmon to the surface when he might thrust his pronged spear into its body; the moth leaves its feeding ground to flutter about the light; the whole town turns out to witness a fire. Through all the ages light has been the most potent of all forces to attract mankind. The advertising value of light is fundamental—no argument is necessary to establish it.

But it is a tendency of the civilized man soon to tire of those things he sees frequently. Something new must be presented or he loses interest. Even light loses it glamor unless new schemes and effects are evolved. The flood lighting of buildings is not new. White lights have been used to draw attention to the architectural beauty of buildings for many years. While such lighting adds to the civic beauty of a city and serves to impress strangers, it soon loses much of its novelty for the permanent resident. He knows it is there but pays little attention to it.

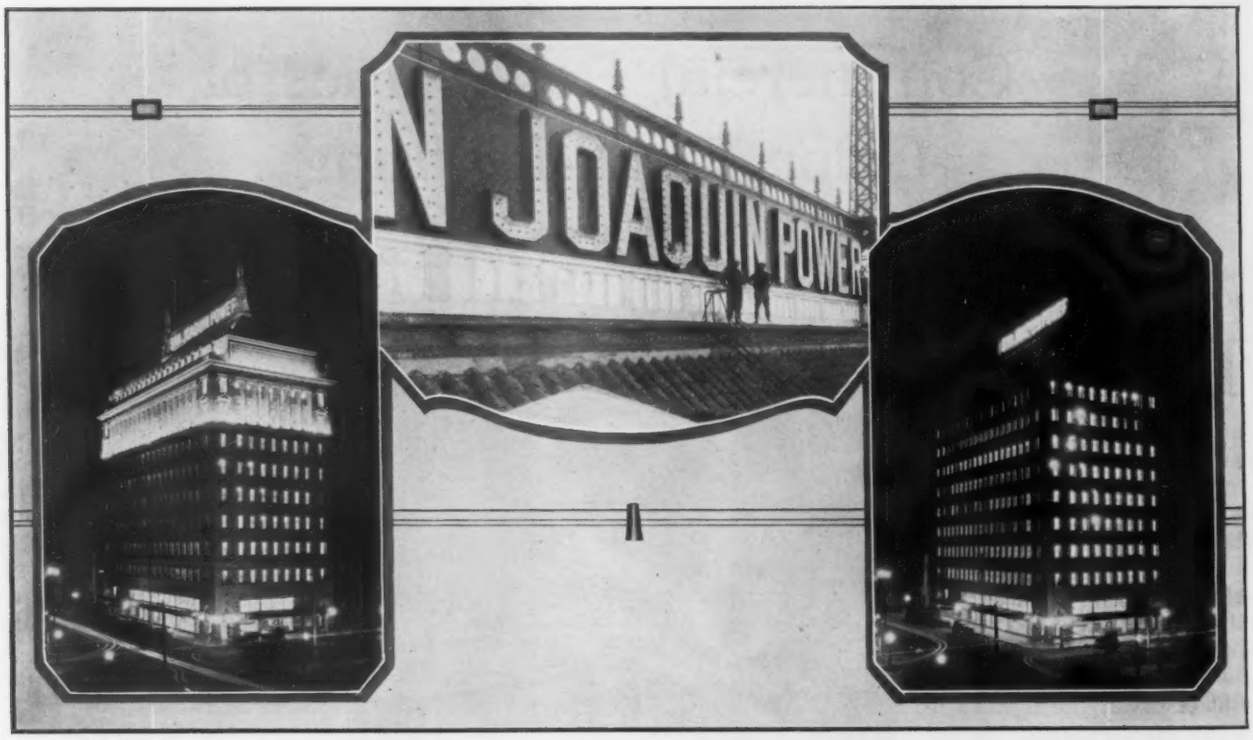
Color flood-lighting is one of the newest developments in the illumination field. One of the finest examples of this new art is the San Joaquin Power Building at Fresno, Calif. In this article the author describes the installation and points out some of the desirabilities of color flood-lighting from the standpoint of building owner, contractor and power company.

With this thought in mind the architects and illuminating engineers studied the problem of flood-lighting the new million-dollar home of the San Joaquin Light & Power Corporation at Fresno, Calif., to design a system of such beauty and variation as to impress all who may view it, not only the first night it is shown but on successive showings. The advertising value of such an installation was given due consideration, first because the building was a model of electrical convenience, embracing faultless interior lighting and every conceivable electrical device from the fractional horsepower electrical towel in all the lavatories to the high-powered motor equipment of the latest model gearless elevator, vacuum blowers, and the 150-ton ammonia compressors of a ventilating system which maintains a uniform temperature of 72 deg. the year around. And like a label on a fine package, it was decided to install a flood-lighting system in keeping with the model interior equipment; and, second, to develop a feeling of good will in the community by a contribution to the civic beauty of the city.

Casting about for an inspiration, the marvelous color effects designed by D'Arcy Ryan for the Panama Pacific Exposition were singled out as a guide. To reproduce on a commercial office building the colored lighting effects obtained on the exposition buildings was the aim of H. H. Courtright of the Valley Electrical Supply Company and his illuminating engineer, Carl F. Wolff, but with one important deviation from the methods employed by Ryan. The scheme must be self-contained as a part of the building, for no chance could be taken to use adjacent roofs or poles to support the flood-lighting equipment. This is always a gamble in a fast growing city such as Fresno.

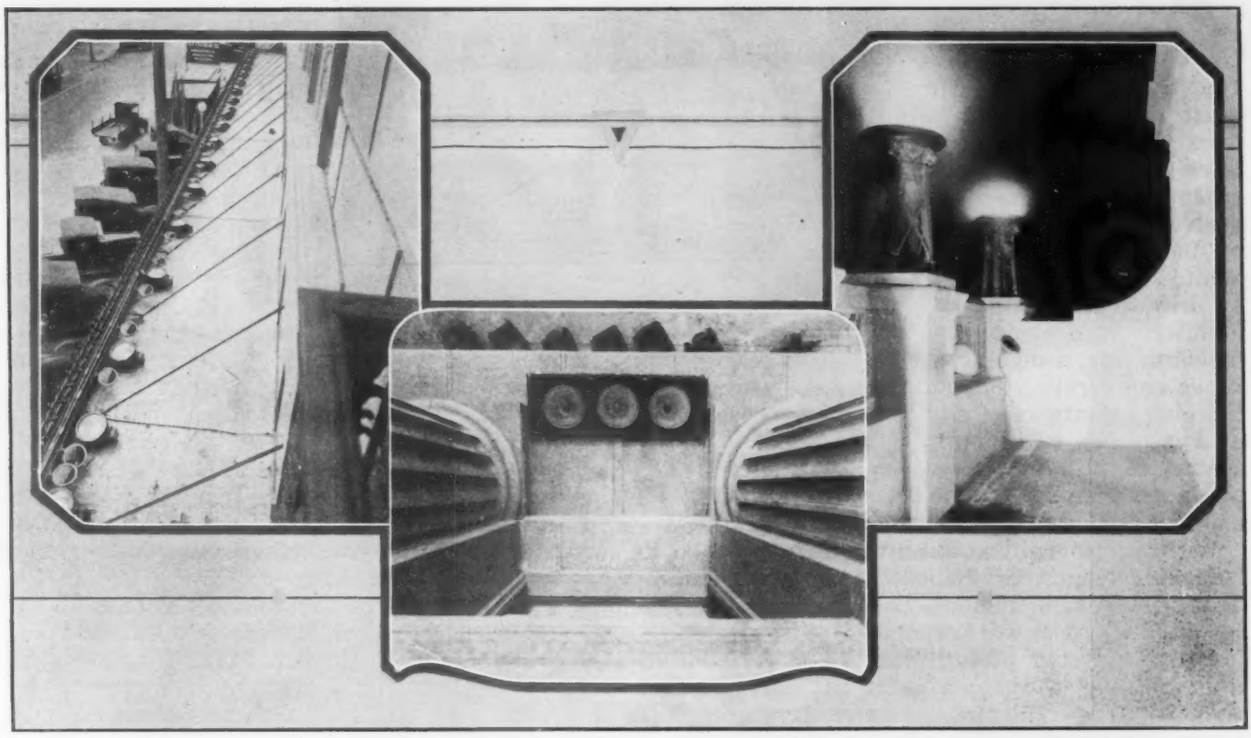
The architecture of the building at once divided the exterior into three distinct components which required their own illumination, as they have distinct architectural detail; yet the ilumination at the same time must tie together these components so as not to destroy the architectural balance.

Properly speaking, there are four parts to the exterior elevation, but, as the first or lowermost part receives its illumination from the interior lighting



The effect of flood-lighting the building with the colonnade and promenade lights only is shown at the left. In the center is a close-up of the sign on the roof. How the building would look with no flood lighting can be determined from the view at the right.

source through the immense glass windows and their transoms, we will give here only details of the three upper components of the flood-lighting equipment. It is sufficient to say that the lobby covering practically the whole of the first floor is illuminated from an indirect source which is capable



Details of flood-lighting equipment on San Joaquin Power Building. At the left are the lights on the marquis. The large units are General Electric type L-15 with 1,000-watt lamps. The small units, used for color lighting, are 250-watt X-Ray No. 51 projectors. The flood lights at the base of the colonnade, shown in the center, are 250-watt No. 810 projectors. The adjustable flood lights on the promenade are 250-watt X-Ray No. 51 projectors. The same type are set in the urns above the steam jets. The lights at the four corners of the building are 500-watt X-Ray No. 60 projectors.

of three intensity controls. In addition to this intense, yet soft, illumination, there are installed varied colored window projectors, two to each window, which permit the display on the lobby floor immediately in front of these windows to be set in sharp contrast to the general atmosphere of the lobby.

The effects are obtained by three banks of concealed flood-lights, the first consisting of 84 projectors mounted on the roof of the marquis above the first floor. Another row of 112 projectors, lighting the colonnade, is buried in the terra cotta on the cornice projection on the eighth-floor line, while a third bank of 21 projectors on the tenth-floor line lights the promenade. Spot lights on the lower corners of the roof gables bring out the roof lines and accentuate the radio towers. Lamps at the base of the towers produce a silhouette effect of the steel framework. No bare lamps are used except those in the sign.

The eight-foot electric sign heralding "San Joaquin Power" extends 60 ft. along the crown of the roof. It is equipped with a flasher by means of which the entire sign may be flashed on and off or the name spelled out letter by letter.

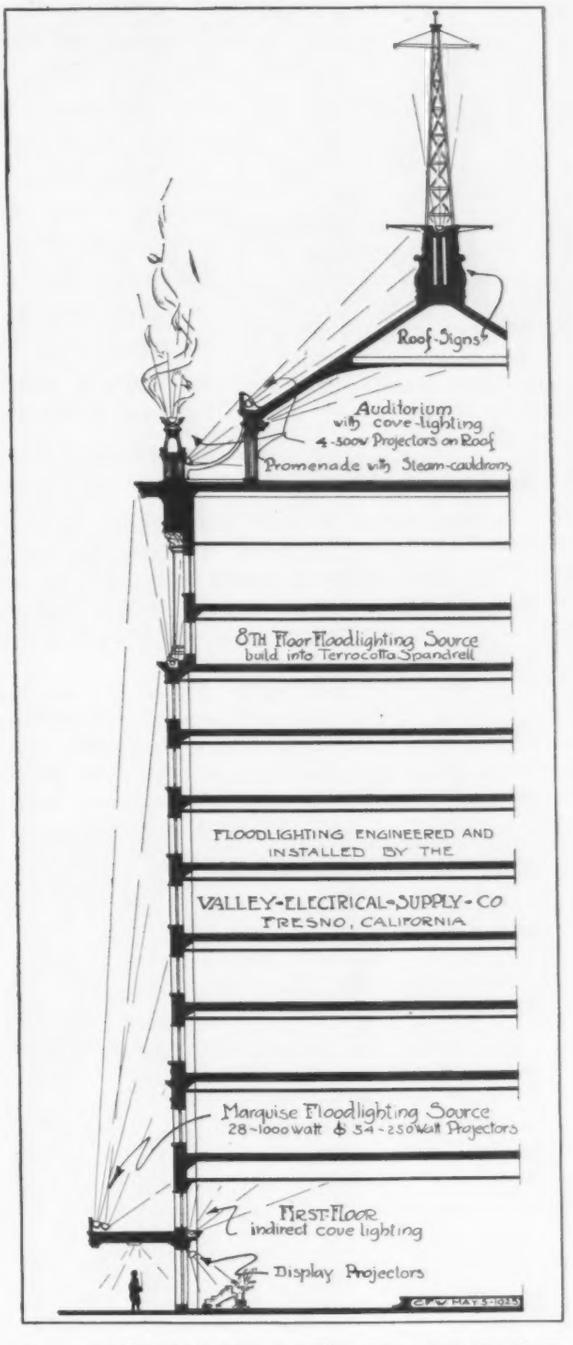
The result is an achievement in illumination. Imagine a cream-tinted terra cotta and pressed brick facade, 90 ft. high, all bathed in a soft magenta or ruby light seeming to come from nowhere yet painting every brick and ornate projection with varying tints and shades of this dominant warm color. Then picture a mauve or purple band, with flecks of emerald green, reflected from a Corinthian colonnade extending another 30 ft. above the base of ruby tints. And above, a narrow band of emerald broken by a row of 21 flaming urns, the flame-colored light constantly in motion. Only a Maxfield Parrish could paint such a picture; only in the wonderful childhood dreams of fairyland could such a scene be brought before the mind. Yet this picture is painted nightly for the pleasure of Fresno, its residents and visitors.

While 48 such color schemes have been worked out, the possibilities of the installation are such that the number of displays may reach several hundred before it can be said that all have been shown. And therein lies the most notable feature of the San Joaquin Power Building flood-light scheme. The constant changing of the color effects draws residents to within a block or so of the building as each new combination is played. No visit down town during the evening is complete until the family has seen the new dress San Joaquin Power is wearing tonight. Ministers have commended the beauty of the building from the pulpit; the luncheon speaker in praising the city never fails to mention the San Joaquin Power Building. It has become a source of pride to the city to have "the most beautifully illuminated building in the world."

What does it cost? Considering the advertising value and good will developed not only for the power company but to the City of Fresno as well the cost is astonishingly small. The 48 effects that have been worked out vary from $3.76 for three hours to $9.36 for the same period. This includes steam used in the urns in the most elaborate scheme, while the standard commercial rate is used for computing the current consumed.

The flood-lighting load is not heavy, the total for the San Joaquin Power Building being 56 kw. Although it may come on during the peak period, it is a high-revenue load and as such is desirable to the power company.

San Joaquin Power has struck a new note in the use of electric lights for commercial flood-lighting. It has commanded the admiration of building owners throughout the West, while requests for details have come from all parts of the world.



Cross section of the San Joaquin Power Building showing the number and location of flood lights.

Annealing Glass with the Electric Lehr

By Kenneth M. Henry
Chief Chemist, Illinois Pacific Glass Company, San Francisco

ONE of the latest applications of electric heat is in the annealing of glass. After five years of experimentation the Illinois Pacific Glass Company has developed equipment which has many advantages over the older types of oil-fired lehrs. Chief among the advantages for which electricity is solely responsible is the close control of temperature within very narrow limits and a better quality of output. From the standpoint of the central station this new type of load is extremely desirable because it has a 24-hour demand.

CLOSE control of temperature within very narrow limits through the annealing cycle of the glassware, together with a better quality of output, are the outstanding results of the application of electric heat to glass lehrs by the Illinois Pacific Glass Company at San Francisco.

Early in 1920 we became dissatisfied with the best results obtainable in annealing glass, and our technical staff undertook the complete investigation of existing methods in order to find means for improvement. Inquiry disclosed that local annealing conditions were no worse than, and not very different from, those of most plants throughout the industry. Annealing furnaces, or lehrs, were of all sorts of designs, but as the underlying principle employed in all was the same, it was evident that the faulty results were due to that principle rather than to the apparatus used to apply it.

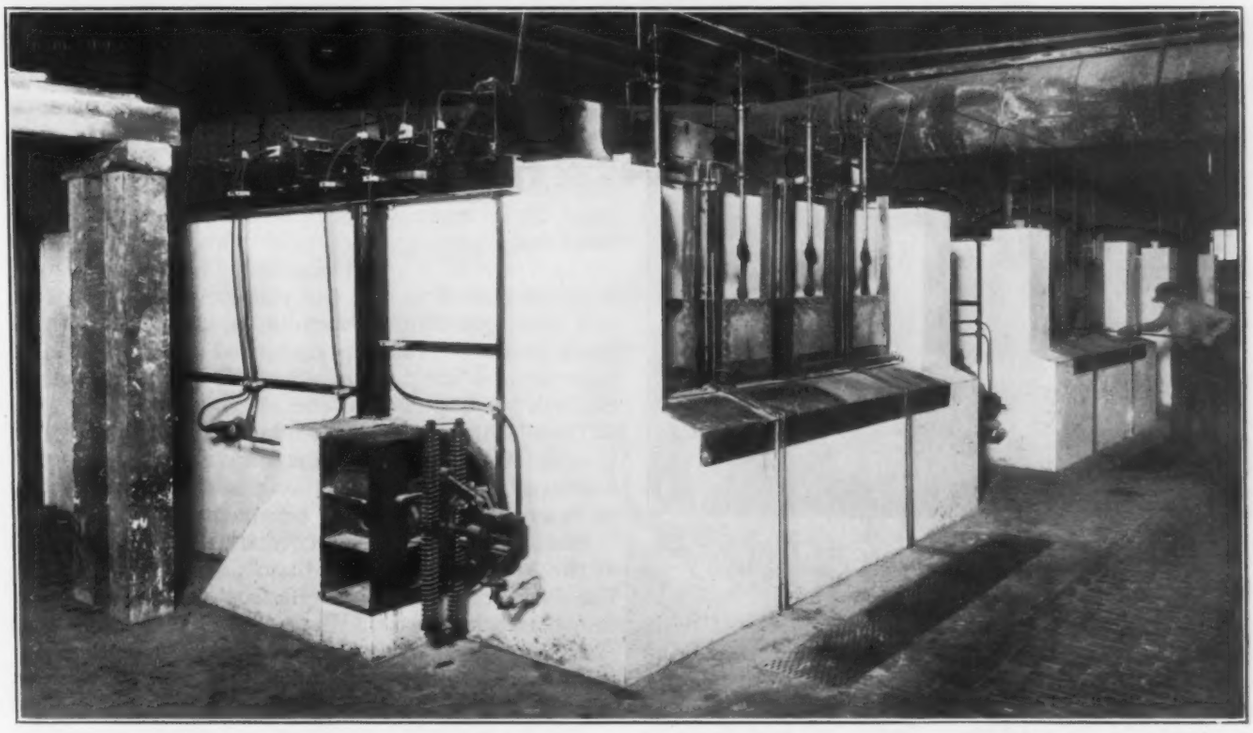
Next it was noted with interest that the development of annealing practice had been the development of the lehr and no serious thought had been given apparently to evolve a theory of the process and thus to improve and perfect the process itself. Manufacturers of glassware had inherited the idea that their ware had to be placed in an oven for annealing, or "tempering," and when the demands of increased production had to be met, they placed moving floors in their ovens to accommodate the output of automatic blowing machines. This increased capacity was accomplished with varying degrees of adroitness, but there was no evidence of any attempt to find out the exact treatment the glass required and to secure the application of that treatment.

Accordingly it was decided to attack the problem in the laboratory, and because glass bottles were the subjects in hand, to find out what a bottle required in order to be annealed properly. Without theoretical digression, it should be explained here that a bottle with its mutiplicity of curves and angles, and its variety of thicknesses, presents a much more difficult problem than the slab or sheet of glass. Nevertheless, after successive months of continuous work, it was learned that all of the supposed vagaries of glassware were obedient to fixed laws and an entirely new method of annealing was evolved. This process, now covered by basic patents, has placed annealing on a truly scientific basis, and has eliminated the "hit-and-miss" operations of former methods.

The success of the new process is due to the close control of the temperature which is affected. As soon as it was discovered how glass becomes uniformly annealed, it was evident that it would never be feasible to secure results by merely applying heat, however carefully measured and controlled, at one point in the annealing course and then leaving to chance and varying conditions the further oscillations of the temperature back to ordinary level. The laboratory work proved conclusively that true annealing only results from following a time-temperature curve that has been determined scientifically. The next step—to determine how wide a divergence might be made from this curve without harmful results—disclosed that the glass would not tolerate a departure of more than 5 deg. F. To maintain such a curve in laboratory apparatus is not difficult, but to reproduce the same conditions on a commercial scale and in a reliable and constant manner is quite another matter. In other words, the laboratory furnished the correct annealing principle, but it still remained to secure a lehr that would apply this principle to practice.

In working out the practical problem, it was self-evident that no sustained curve could be secured in any apparatus that only generated heat at one fixed place. It was equally apparent that the heat supply would have to be cut off and renewed at frequent intervals in order to maintain it at constant levels everywhere. The answer therefore was that there must be automatic control operated by the temperatures themselves, and this narrowed the choice down to electricity as the source of heat energy.

At first the high cost of electricity as a heating agency made its use seem prohibitive. Nevertheless it was decided to design and build an experimental electric lehr, and in cooperation with the engineers of the General Electric Company this was accomplished in 1921. Like all wise experiments this was

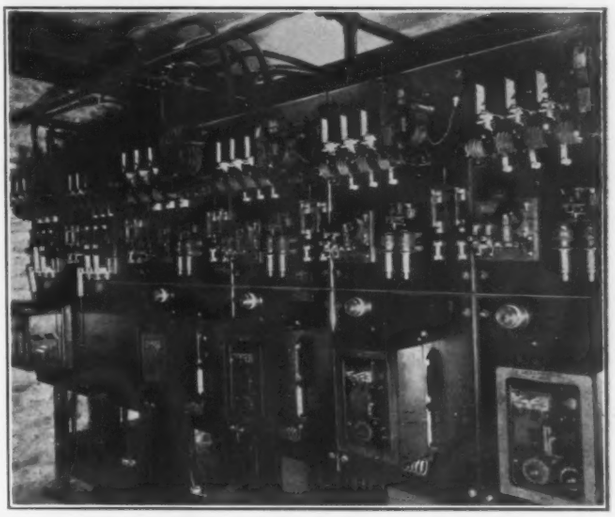


The front of a battery of three electric lehrs showing the compressed air operated doors through which a workman passes the hot bottles. On the side of the first lehr may be seen some of the wires leading to the heating elements.

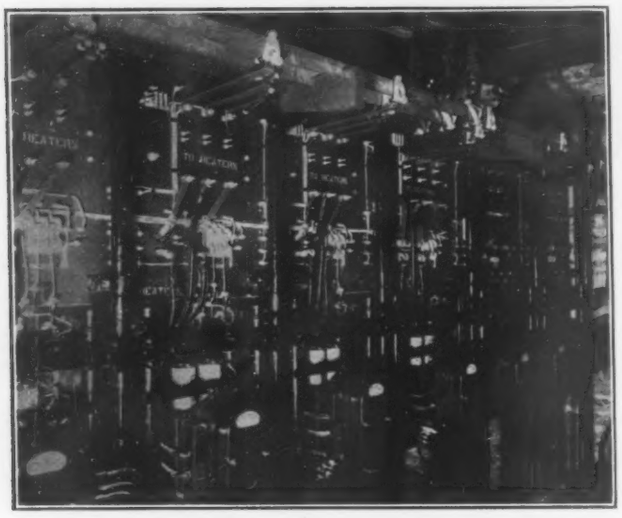
a modest one although large enough to give commercial results. This first lehr has a continously moving conveyor 5 ft. wide and 50 ft. long; this was furnished by Stephens-Adamson Company. The nichrome heating units have a connected load of 160 kw. The power is supplied at 220 volts, single phase, 60 cycles. The lehr is divided, by imaginary lines, into three parts—heating, annealing, and cooling. The electric units are so distributed on the sides and top of the lehr in these three departments that they maintain constantly and unvaryingly the temperature curve mapped out in the laboratory. The conveyor, returning from the cold end of the lehr, is preheated on the return by a special set of heating elements. The lehr is insulated adequately with carfully laid Sil-o-cel brick. The heat control is maintained automatically within 5 deg. by Leads & Northrup controlling potentiometers that make and break the corresponding contacts on the switchboard.

As far as annealing was concerned the first lehr was a complete success from the very outset. The automatic regulators functioned as planned and kept the temperatures well within the limits laid down. Nothing was left to be desired in the maintenance of the curve on which the annealing depended. The consumption of electric power, while not prohibitive, was in excess of the limit desired for the economic success of the new process. But this has yielded to new studies, and without any alteration of the process or of its established time-temperature curves, the electric lehr now has been placed on an even keel with others in the matter of economy of operation.

Thus the experimental lehr was a true success and by means of the knowledge gained from it a larger lehr was designed. This second lehr is 8 ft. in width and 55 ft. long with a heating space 25 ft. in length; subsequent lehrs are 9 ft. by 60 ft., which has been found to be a more satisfactory size. The conveyor belt is made up of special patented pans which cut off all stray currents of air. Its automatic doors confine the heat at all times that glassware is not actually passing into it. The doors open by compressed air and operate with a foot-control button; as soon as the operator removes his foot they close automatically. The total connected load in each lehr is 300 kw. with a usual operating load of 80 kw. The lehrs are in continuous operation 24 hr. every day in the year. Current is supplied at



The front of the control board for the electric lehrs. Heat control is automatic within 5 deg. through the use of Leads & Northrop controlling potentiometers.



The rear of the control board showing the heavy bus construction and the individual meters on each lehr.

220 volts, 3 phase, 60 cycles. The load varies with the amount of glass in the lehr. The current maintains the proper temperature cycle and supplies the radiation losses. All of the apparatus is completely automatic in its operation. Individual meters have been placed on each heating unit so that it is possible to tell if everything has been working satisfactorily over a given period; and if not, to estimate how long the particular unit has been out of operation. One of the advantages of electric heating is the fact that bottles come from the lehr sterilized.

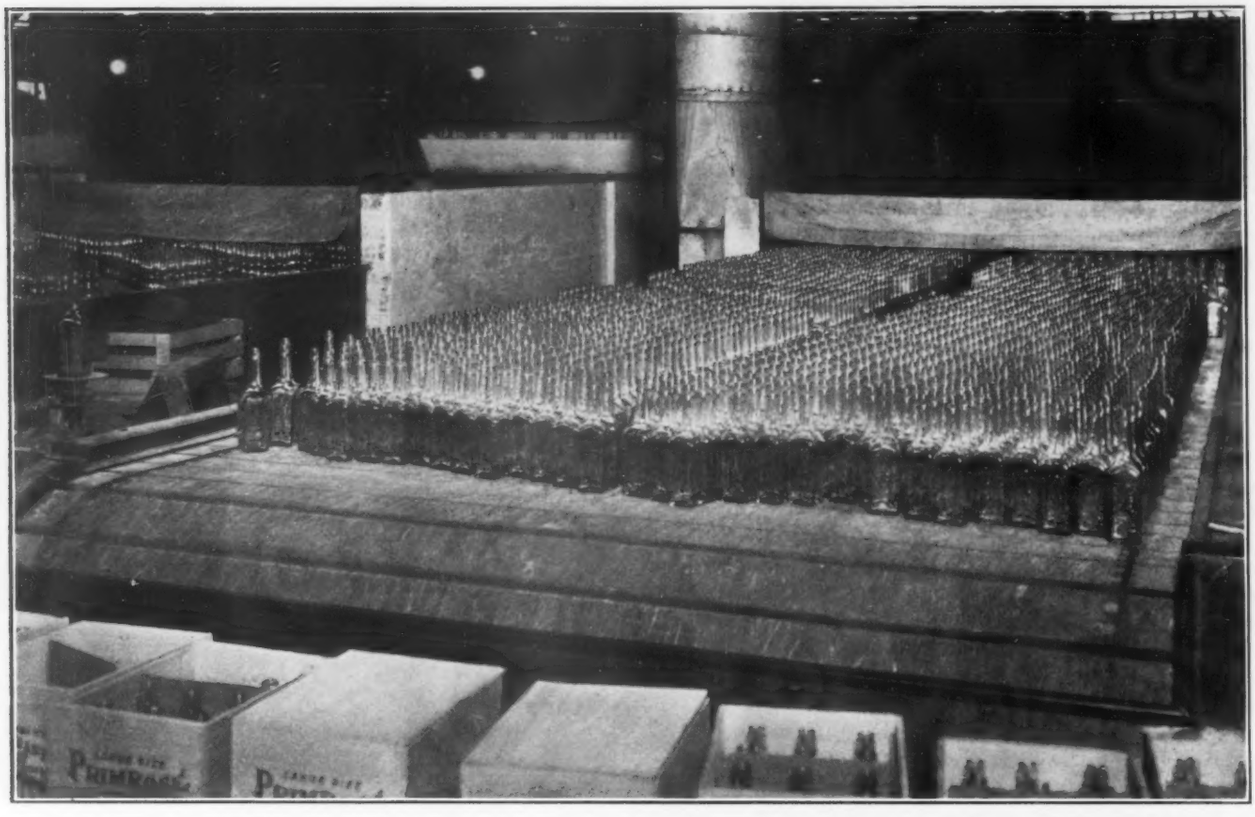
Previously it was necessary to leave bottles in a lehr from 4 to 10 hr. while with the electric lehrs this time has been reduced to one hour and thirty-five minutes. The first lehr now has five successors, each of which is doing its work, comfortably, perfectly and as cheaply as the old lehrs which it has displaced. The demand for the very superior ware from these lehrs has been so insistent that it has been embarrassing to complete the change of lehrs as leisurely as we had planned. In fact, we have been compelled to put the electric lehrs into place and into operation as rapidly as the shut-down of glass furnaces would permit, and in a short time this factory will be annealling its entire output in the new way.

Three lehrs are grouped together in a bank which is complete in itself, each bank having its own transformers. At present one bank is complete and two more are in the course of construction.

Incidentally it may be added that the maintenance of the new lehrs is so low in cost as to be negligible. The first experimental lehr has cost for upkeep during the three and one-half years of its operation a total of $25 and is today in as good condition as when installed. The other lehrs have cost nothing over an operating period varying from two years to a month.

Two equipments recently have been purchased by the company for use in its Alton, Ill., plant which will have a connected load of 470 kw. each.

The writer is indebted to P. D. Burtt, superintendent and engineer, and George W. Fiske, chief electrician of the Illinois Pacific Glass Company, for their cooperation in the erection of the lehrs.



The back of one of the electric lehrs showing annealed bottles emerging ready for packing. The electrically driven conveyor travels at a speed of 6 in. a minute. In other types of lehrs it was necessary to wash all bottles after annealing.

Utilization of Electricity in the Salt Creek Oil Fields

By Chauncey H. Vivian
Boulder, Colo.

A 25,000-kw. generating plant recently has been put in commission by the Midwest Refining Company in its operations in the Salt Creek oil field near Casper, Wyo. The transition from steam and gasoline power is now under way at the individual wells, and within the next few months the operations will be electrified completely.

The plant is unique in several respects. Chief among these is its use of natural gas for fuel. This is derived as a waste product from the gasoline-extraction plant. The gas is produced from the company's own wells. Because of the recovery of its gasoline content and the further fact that the government requires no payment of royalty upon it, a remarkably cheap fuel is obtained.

Another unusual feature is the use of artesian water for both condensation and boiler purposes. This is secured from a well which was drilled at Tisdale a few miles away in prospecting for oil in 1917. This water is delivered through a pipe line laid and operated by a private company.

The plant is situated at the north end of the field, approximately 30 miles north of Casper. It is housed in a fireproof structural steel and concrete building 150 ft. long, 117 ft. wide and averaging 50 ft. in height. Four 96-in. steel stacks rise 60 ft. above the roof. Adequate lighting facilities are provided, the installation of window panes being 5,400.

Four steel-encased, 1,300-hp. boilers of water-tube type comprise the steam plant. They are designed to deliver from 200 to 300 per cent rating. Each is 17 by 18 ft. in area and 41 ft. high. They operate at 275 lb. pressure. Induced-draft fans are installed in the stacks to draw off the waste gases.

The flame is applied in the boilers through cross-type burners consisting of 110 to each boiler. To care for emergency needs there also has been installed a fuel oil burner system in the boilers. From the boilers the steam passes through superheaters and is delivered to the turbines through 18-in. pipes.

Two units of 12,500 kw. each have been installed in the generating room. To each is connected a 16,000-sq. ft. condenser. Air for cooling the generators is drawn from outside through a tunnel and is filtered to remove dust. A 500-kw. house turbine is present as emergency equipment to drive the auxiliaries in case of outages.

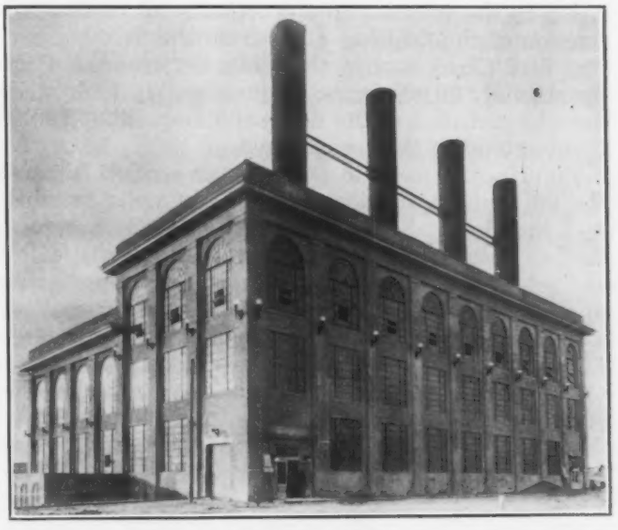
Two steam circulating pumps of 18,000 gal. per min. capacity furnish the circulating water to the condensers. They are driven by 400-hp. motors. Two boiler feed pumps of 400 gal. per min. capacity operate at 350-lb. pressure. One is driven by a 450-hp. motor and the second by a 150-hp. steam turbine. Three house service pumps, driven by 50-hp. motors are installed to furnish water to all parts of the building. Each has a capacity of 500 gal. per min.

Two evaporating systems for supplying distilled boiler feed water are present. The water also passes through a deaerator to remove gases which might affect piping. Each electrical unit functions separately, control being provided through a central switchboard. A 40-ton traveling crane is provided overhead and a 10-ton auxiliary hoist is provided for handling small loads.

Power leaves the plant through four 33,000-volt lines extending to six main substations, of which three are located on each side of Salt Creek field. There it is stepped down to 4,000 volts, while it is reduced to 440 volts at substations provided for the individual leases where the power is used.

Originally it was planned to impound flood waters of Salt Creek to provide condensation water, there being no stream of regular flow in the region and no lake of sufficient size to answer the demands. To create a reservoir, a dam 960 ft. long, 47 ft. high and 12 ft. wide at the top was constructed. It has a concrete core and contains 2,000 ft. of drain tile. A tunnel 7 ft. high, 6 ft. wide and 400 ft. long extends through the dam, fitted with high pressure gates to regulate the flow of water. Water going through the condensers is screened by stationary and traveling screens.

This reservoir was planned for an area of 22 acres and a capacity of 21,000,000 bbls. Flood waters with



Exterior of the new 25,000-kw. steam plant of the Midwest Refining Company in the Salt Creek oil fields of Wyoming. Energy is used exclusively for the operation of the oil fields belonging to the company.

which it initially was filled brought down considerable silt and debris which reduced the impounding capacity to some extent.

The transmission line utilizes 6,000 cedar posts. Two of the 33,000-volt lines form a loop about the field, following section lines. A third extends southward to Teapot Dome adjoining the Salt Creek field.

The electrification of Salt Creek field comprises one of the largest industrial generation projects in the country. Investigation looking toward the change was started in 1921. A report was compiled by F. O. Prior of the company's engineering staff, working under the direction of A. W. Peake, chief engineer, who had charge of the construction.

After years of operation of the wells the gas pressure which at first forced the oil to the top of the ground in the form of gushers was reduced to such point that many of the older wells had to be placed on pump. Individual pumping units were installed at each well, being powered by gasoline or steam engines. A number of these were replaced with motors driven by power generated at the gasoline-extraction plant and careful costs kept over a period of months. These observations convinced the company of the utility of electrifying the entire field, and plans for the construction of the plant were then formulated.

In addition to the pumping operations, new wells also will be drilled by electric power, and the saving in this work will be great.

Up to the present time practically all of the production of the field has come from the first and second Wall Creek sands, which blanket an area of approximately 20,000 acres. Approximately 1,250 wells have been drilled to the first sand and all but 130 of them extend to the second sand.

Figuring 20 wells to the quarter section to raise the oil content, it will require 2,500 wells to "drill up" the field. Some operators contend, however, that as future years bring a greater scarcity of oil and a higher price, it will be economically profitable to drill as many as 36 wells to the quarter-section, which would bring the total wells to approximately 4,500.

Recent deep drilling operations have revealed the presence of oil in deeper sands, and it is probable that before the field is abandoned practically all of the existing and future wells will be extended to lower strata. All of these then will reach the stage where they will have to be placed on pump to insure yield. It may readily be seen that the load on the plant will increase constantly and that it ultimately will reach a point where the present generating power will be insufficient. Foreseeing such a condition, the plant has been constructed with a view to economically adding one or more units.

The vast amount of electrical equipment that will be required as development of the field progresses can be gleaned from the statement that each well will require an individual motor with connections. These motors for pumping purposes vary from 5 to 75 hp.

The plant was placed in operation early in January, 1925, and connections with the various wells have been made as fast as possible since that time. On Jan. 15 there were 215 wells in the field that had ceased flowing. It is estimated, however, that when all are placed on pump they will yield from 10,000 to 15,000 bbl. of oil a day, which will gradually decline over a period of years.

No doubt many readers are wondering in their own minds why such a heavy investment was made in a steam-electric central station which in turn calls for an additional expenditure in electrical equipment for well installations, substations and transmission lines. This question can be answered by stating that the application of electricity for pumping and drilling purposes in oil fields has proved a decided success in the California and Mid-Continent fields. Statistics from several different oil companies operating in these territories prove beyond a doubt that electric power applied with good judgment has proved more economical than either gas or steam engines.

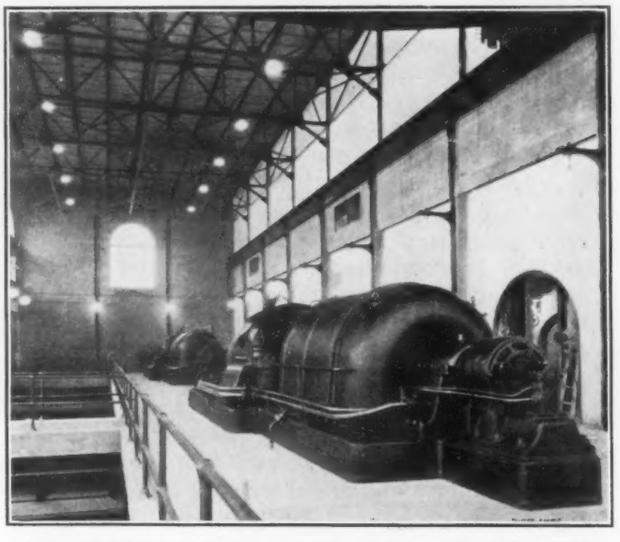
Preliminary investigations of engineers indicated that the cost of electrical installations at the wells would average 20 per cent less than any other power system, while the operating cost was computed to be 40 per cent less. A great amount is saved in labor, engineers and firemen being dispensed with at pumping wells under electrification.

From a safety standpoint it also was estimated that the electrification would pay. Electric lighting of rigs is expected to reduce the number of accidents in night drilling, while the danger of explosions in gassy areas also has been lessened greatly.

Salt Creek is the only field in the Rocky Mountain region operating wholly by electricity, although installations in other fields of the country have shown that the method is entirely satisfactory in every way.

The power will be used by the Midwest company exclusively. This use will extend to its operations of a number of leases held by subsidiary or allied companies.

The cost of the plant and transmission line was approximately $2,500,000. C. S. Saunders was superintendent in charge of construction, and W. R. Finney is in charge of the operation of the plant.



Interior of the turbine room in the new steam plant of the Midwest Refining Company showing the two 12,500-kw. units.

Is the Electric Air-Heating Load Desirable?

By George W. Barker
Allied Industries, Inc., San Francisco

ELECTRIC heating of homes and offices has been a controversial subject for many years. Many reports and studies have been made both on its desirability and its disadvantages. However, there are certain sections of the country, especially in the far West and in the South, where electric air heating is feasible and at the same time attractive from a central-station standpoint. In this article the author discusses some of the most debated phases of the subject.

ELECTRIC air heating for a long time has been a bone of contention among central-station executives. Those who, for various reasons, favored an increase in this class of business argued strenuously in its behalf. Others, opposed to the heating load, perhaps for reasons of expediency, have labored just as assiduously although possibly not as openly to forestall its increase. In either case it has been woefully true, as a general proposition, that argument has been based on nothing more substantial than individual conviction. The real merits of the case have not been investigated with sufficient care, and fact has been supplanted by fancy.

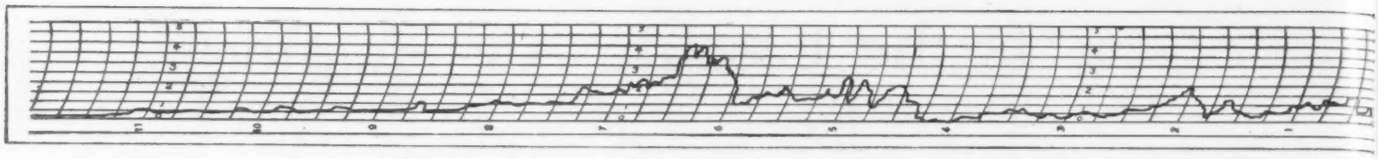
It is probably indisputable that electric heating of homes and offices has reached a higher state of development on the Pacific Coast than anywhere else in the United States, or, perhaps, in the world. It is certain that electric heating is applied more broadly in that territory than elsewhere, and this statement is made despite the recent rapid increase in this application in Florida and certain other Gulf sections.

The reasons for this extensive development in the far West are not difficult to find. Climatic conditions prevailing west of the Rockies, influenced by the warm Japan current, show few instances of great temperature extremes. Therefore, the range of difference between outside and inside temperature is very limited, and the heating problem becomes thereby materially simplified. A second and highly important factor is the extensive hydroelectric development found in that section. It is a known matter of fact that some Western power companies have 100 per cent hydro development, and the usual ratio of hydro to steam is very high. These extensive hydro properties frequently have made possible energy generation at extremely favorable costs, these costs having been stated to be as low in some instances as four-tenths of a cent per kw-hr. at the power house bus bars. Transmission costs of course have had their effect on total energy costs, but the net delivered cost of electricity has remained favorable.

A third factor of importance has been the fact that many Western power companies have had to pioneer a virgin field not densely populated and have been forced to advanced methods of load-building to compensate in part for the heavy capital investment required for economic and economical capacity development.

The net result of all of these conditions has been a generally not unfavorable attitude among Western power companies — expect in certain dual utility instances — with regard to electric heating, and a load has been developed that on careful analysis has produced much interesting information for central-station executives. The experience of Western power companies, therefore, should be of interest and value to all officials concerned with electric load-building.

A recent article in the National Electric Light Association Bulletin (April, 1925, p. 229) reads in part as follows: "Probably many of us know of the study and investigation into the commercial possibilities of electric house heating, conducted recently by the Smithsonian Institution at Washington. Their summary of the situation was crystallized in the opinion that 'electric heating of houses from an economic viewpoint is impossible.' The Public Utilities Commission of Idaho, in their 'Opinion on Electric Heating,' said this: 'We all know that electricity does produce heat, and we all realize and appreciate what a wonderful thing it would be to dispose of our coal piles and ash pits, and smoke, dust and cinders, and would, therefore, fain think it practicable. But a most cursory study of the subject either from the standpoint of thermal dynamics, or social or economic science, shows that it is utterly impossible.' " This article goes on to say that "these Idaho investigations were concerned also with the investment that would be needed for electric house-heating equipment. In this connection their report continues: 'This should, in itself, readily demonstrate the impossibility of rendering heating service, because it means that for the small five or six-room house, costing from two to three thousand dollars, according to finish, a heating plant costing approximately $3,400, must be provided in order to heat the house by electricity. Obviously no sane individual would equip a house with such a plant, and no more can the public utility corporation make the invest-



Typical load curve of all-electric apartment house. Superimposing this upon

ment for him.'" Unfortunately the article above quoted does not continue and make clear the circumstances surrounding the report of the commission referred to. To do so would make the matter appear in a very different light. It is interesting to note, in passing, that there is not on record a single house of the size mentioned in the quotation wherein the electric heating plant has cost, including wiring, anywhere near one thousand dollars, and it is further interesting to note that far from being impossible from the standpoint of social or economic science, electric heating is being applied in increasing volume and with growing satisfaction.

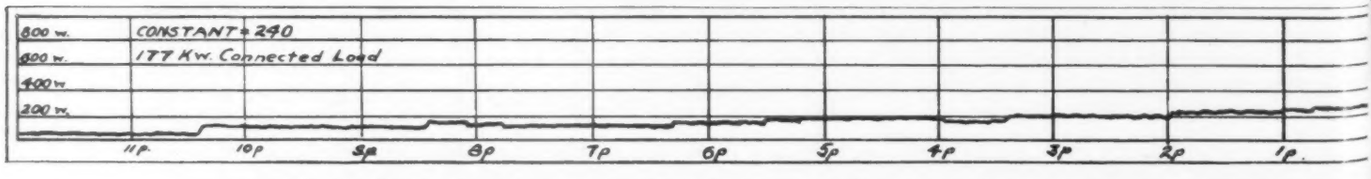
It does indeed seem difficult to understand why such specific attempt should be made generally to discredit a load that has been found to be not only practicable but attractive as well, while being at the same time economical and satisfactory to the consumer. In the West it has been found that the cost of wiring for electric heaters is about one-half of the cost of the heaters themselves and that an adequate electric heating system for an average six-room house costs about $300, exclusive of the wiring. This is based on six heaters at an average price of $50 each. The wiring, if done at the time the house is being built, averages about $25 per circuit, based on one heater per circuit. If the wiring is done after the house is completed it has been found to average up to $45 per heater circuit. These figures are taken from nearly six years' experience and from literally thousands of installations. Therefore, they may be accepted as representing true averages. The heater costs are derived from these same installations and include both portable and wall-type heaters of 2-kw. capacity or greater, up to 6-kw. No reference is made in this article to heaters of less than 2-kw. except as concerns bathrooms and very small rooms where 1-kw. or 1.5-kw. heaters have been ample in capacity for the maximum heating requirements of a particular installation. The so-called "lamp socket" or 660-watt heater is not taken into account in this article or in the figures given.

The statement has been made that "the heating of rural homes with electric energy is not within the realm of the practical" and that "it has been found by actual test that about 60,000 kw-hr. of electric energy would be required per annum for the heating of an eight-room, 16,000-cu. ft. capacity house." A careful study of meter records fails to reveal any Western house of eight rooms that is using 60,000 kw-hr. per year for **all-electric** service, which includes heating, cooking, lighting and water-heating. Instead of this would-be terrifying amount, the average is about 12,000 kw-hr. in California and sometimes does reach 18,000 kw-hr. per year. In this connection it should be borne in mind that there is a vast difference between these figures and the consumption of energy for lighting alone.

Many all-electric homes, using only electricity for cooking, lighting, heating and water-heating, have average monthly energy bills of $20 to $25. For six-room houses this is a high average, and actual experience often shows much lower average bills. Houses of nine rooms show a high average of $30 per month for all-electric service. When the average lighting bill of $7.50 for a house of this size is deducted from this figure it shows a reasonable cost for cooking, heating and hot water. Going a step further, the average monthly operating cost for an electric range in an average family of five people has been found to be $5.25. A total deduction, therefore, of $12.75 brings the average heating and hot-water cost down to $17.25 per month. These costs are based on rates as follows: First 30 kw-hr. (average) 7c; next 150 kw-hr., 3½c; all over 150 kw-hr., 2c. Hot-water costs vary greatly, according to individual family requirements and according to the construction of the house. So do heating costs. In general it has been found that hot water costs as much as air-heating, and continuous hot water often has been found to cost as much as all other electric service on the premises.

The all-electric home has proved so satisfactory that many real estate tracts are being fully electrified and subdividers are, in other instances, wiring or installing conduit for complete electrification at a later date if home buyers desire. Still other builders are even cutting recesses in the wall for later installations of flush-type heaters and are papering over these recesses if the equipment is not installed at the time of building. This procedure has occurred in many instances in spite of and not because of the power company. It has been brought about by the extreme satisfaction noted on the part of those who are occupants of electrified residences and by the consequent growing demand for this type of home.

Electric heating load is always at unity power factor. There are few sections where some heat is



Electric heating load in an automobile paint shop, showing the consistent character of the load. Improved

any system load will give a picturization of the value of this type of load.

not required at some time during every day of the year. Generally this demand is at an off-peak hour. It has been found that the installation of electric-heating systems has caused consumers to demand heating service more often, with a consequent favorable effect on revenue and an added justification for plant investment. The load most often is carried in the early morning and late afternoon and early evening. It thus occurs before and after the industrial load and overlaps only the lighting. No load condition without some overlap has yet been developed. The load normally can be delivered with only slight increase in local plant, and the increased consumption per meter lends to the attractiveness of this service. The load characteristic presents a strong argument in favor of its development. The consumer's satisfaction lends to the strengthening of public relations.

Air-heating installations average about 18 kw. per six-room house. All-electric homes of this size average about 30-35 kw., or 40-48 hp. connected load. This load equals or exceeds that of many small industrials, shows much better load characteristics and often is taken at a more favorable rate. Electricity, unlike gas, involves no storage problem. The domestic gas-heating load is already a burdensome problem on account of its winter-peak characteristic, and great effort now is being made by at least one company to develop a gas load at a special low rate that will fill in the summer valley. In those states where irrigation is common the peak electric load frequently comes during the summer irrigation season while the valley occurs during the winter. Electric heating serves to counter-balance this condition and to raise the level of the winter load approximately to that of summer. It therefore materially helps the system load factor and increases the value of plant investment.

Electric water-heating is a valuable part of the heating load. Energy consumed for this purpose forms a large part of domestic electric bills in those houses equipped with electric water heaters. In the usual residence equipped with a heater thermostatically controlled and using continuous hot-water service, this load floats on and off periodically. In systems so constructed that only a portion of the water in the tank is kept hot all of the time, the balance being controlled by a manually operated valve, the effect on the line is very slight and even where the whole tank is kept hot the floating load seldom exceeds 5 kw. In larger residences, apartment houses and other large buildings it is possible to install water-heating systems operating at nearly 100 per cent load factor, thus creating an ideal load which is entitled to a low rate on account of its high revenue-earning power per kilowatt-year. In all-electric apartment houses this figure often reaches $45 to $50 per kilowatt of demand, the maximum demand being about 40 per cent. Water-heating has produced $94 per kilowatt of demand per year. These earnings command attention.

Apartment houses electrically heated show an attractive load diversity, this diversity increasing as the number of apartments increases. Cases are at hand where service is being supplied from transformers having only 40 per cent capacity as compared with the total connected load. Electric heating is now in demand for banks, schools, theaters, hospitals and other public buildings as well as for residences. It doubtless has better load characteristics in domestic than commercial application, but it has been found profitable even as a daytime load.

Opponents of electric heating often quote, in many cases without reference to their antiquity, various reports of commissions and individuals that have been issued to cast reflections upon this class of business. It is not so very many years ago that opposition of similar character was advanced against the electric cooking load. How erroneous, and consequently how futile, this opposition was is evidenced by the fact that one Western central station recently placed one order for over a thousand electric ranges, most of which already were sold to the consumer before they were purchased from the factory. For the central-station industry to make the same mistake twice—namely, to oppose the development of business that is mutually advantageous—would be to cast discredit upon the brains of that industry.

The electric heating of homes and other buildings is so attractive from the consumer's standpoint that this load will be developed in spite of—if it is not developed with the assistance of—the central station. Executives will do well to study the situation carefully and to assist in the intelligent development of a service that produces comfort, satisfaction and good will and that at the same time shows attractive earning power for the capital invested.

quality of product and reduced time of process have made electric heating for this purpose a popular form of application.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

New 60-kv. Substation Completed at Spokane, Wash.

East Side Substation of The Washington Water Power Company Involves Interesting Construction Features

By RICHARD McKAY, Engineering Department. The Washington Water Power Company, Spokane, Wash.

The new 20,000-kva. substation of The Washington Water Power Company is located east of the city of Spokane and just south of the Spokane River. Right-of-way was obtainable north and south from this point so that all high-voltage lines entering Spokane eventually can be brought into this substation. The location is close to the probable center of power load incident to factory and industrial development. At present four 60-kv. lines, one from Long Lake station, one tie to the old Twenty-ninth Avenue substation, one tie to Post Falls, and a feeder to the Palouse district enter the station. Two 13-kv. tie lines to the old Post Street substation and five 13-kv. feeders leave the station.

All structures are of wood and all lines entering are on wood poles. However, this substation has been laid out so that when it reaches a large size, due to increase of load in Spokane and the bringing in of power from sites now undeveloped, it will not interfere with the construction of a steel substation on this site.

The single 60-kv. bus is 3/0 stranded copper with each wire strung as a span from the two ends of the structure with five Hewlett type strain insulators. The bus is also supported between bays by post-type insulators made up of four Jeffery DeWitt post-type units. Taps to the bus are of 1-in. galvanized iron pipe, but from oil circuit breaker and lines to disconnects is 3/0 stranded copper. An oxide film lightning arrester will be mounted at one end of the 60-kv. bus structure and connected to this bus. The 60-kv. oil circuit breakers are General Electric 70-kv., type FKO-136, and are equipped with one double-ratio current transformer per phase for relay operation. The disconnecting switches are made in the shops of The Washington Water Power Company, using three Jeffery DeWitt post-type insulators for each stack.

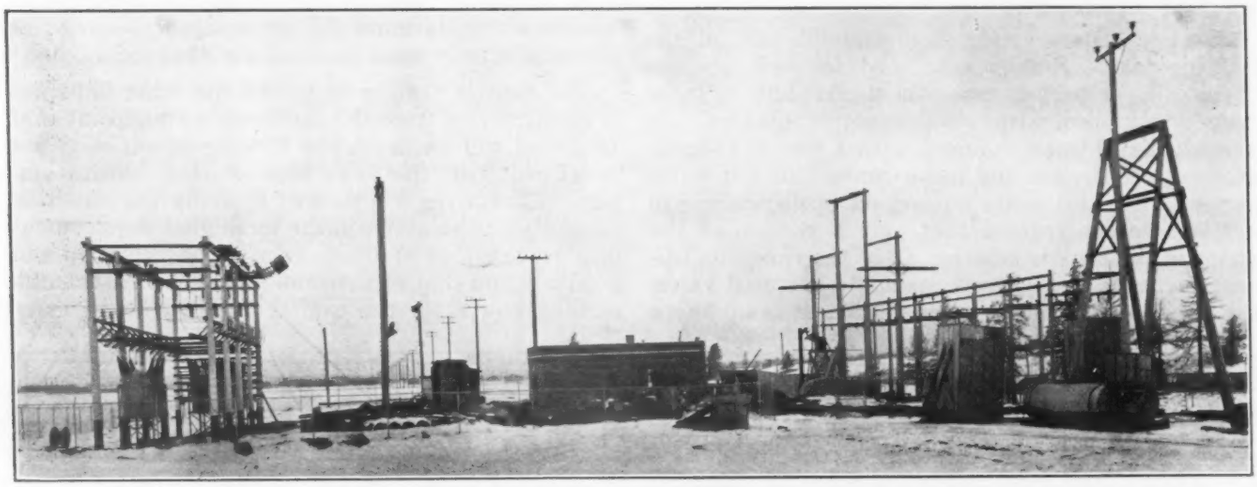
No oil circuit breaker at present is installed in the 60-kv. side of the transformer bank, but the charging current will be broken by a 3-pole air switch of Pacific Electric manufacture.

The transformer bank is made up of three single-phase, water-cooled units with one spare, each rated 6,667 kva., 110,000 or 55,000 to 13,800 and 6,900 volts. They will be operated for the present delta-wye with the two halves of the high side winding in parallel. The normal rating on this winding is 110,000 volts or on the two halves in parallel 55,000. However, the transformer was designed to operate on 115 per cent excitation or 63,600 volts, giving 13,800 volts with the 6,900-volt winding connected wye. Later, the line from Long Lake station will be changed to 110,000 operation, and this bank then will be operated delta-delta 110,000 to 13,800 volts. Water-cooled transformers were selected on account of cost and the fact that abundant water suitable for cooling could be obtained from a shallow well dug at the substation. Duplicate pumps each large enough to supply water for two transformer banks are installed. They are driven by 10-hp. squirrel-cage induction motors which are started direct on the line with knife switches.

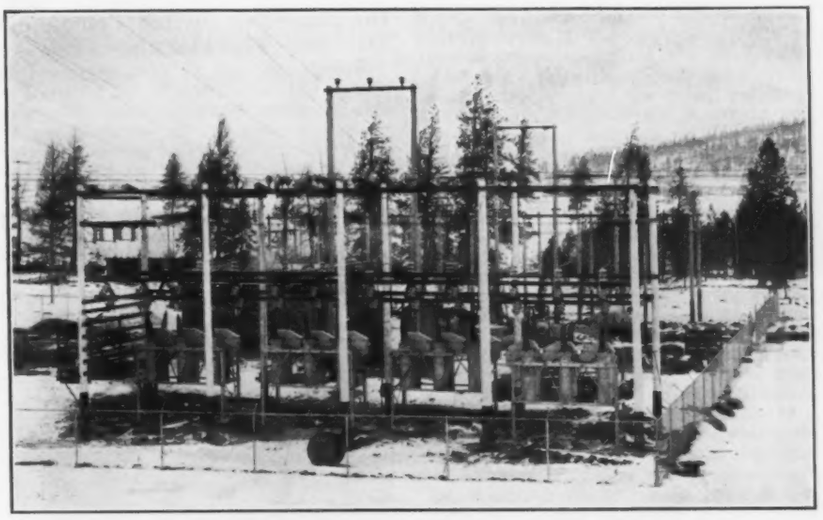
A water-flow alarm is installed to sound a Klaxon and give a light signal if the flow drops below a predetermined value. The outgoing water flows into a pipe with an adjustable valve in the bottom of it. Off this pipe is tapped a small pipe leading to one end of an iron U-tube filled with mercury and with a float in the other leg of the U-tube. The float when it rises will tilt a mercury connection tube which rings the alarm and gives a lamp signal. The head in the pipe into which the outgoing water discharges can be adjusted by the valve in the bottom of it for any flow. When this flow decreases, the water head drops and the mercury level in the U-tube is lowered, tilting the mercury tube and giving the alarm.

A duplicate 13-kv. bus is installed with disconnecting switches for selector switch and oil circuit breakers in the lines and transformer bank. The buses are of 1,000,000 circ-mil bare copper strained from the ends of the structure with Hewlett type strain insulators and supported between bays with Thomas 27-kv. pin-type insulators. This bus has been installed several weeks and is very neat in appearance with no noticeable sag. Taps to the bus are 3/0 stranded copper. An oxide film lighting arrester will be installed on each bus.

All 13-kv. disconnects were furnished by the Maxwell Engineering Company. The insulators are Thomas pin-type,



East Side substation of The Washington Water Power Company at Spokane, Wash., showing the station under construction. The 60-kv. structure at the left is completed, while only the framework for the 13-kv. transformer and bus structure appears at the right. One of the transformer tanks is on the ground at the right

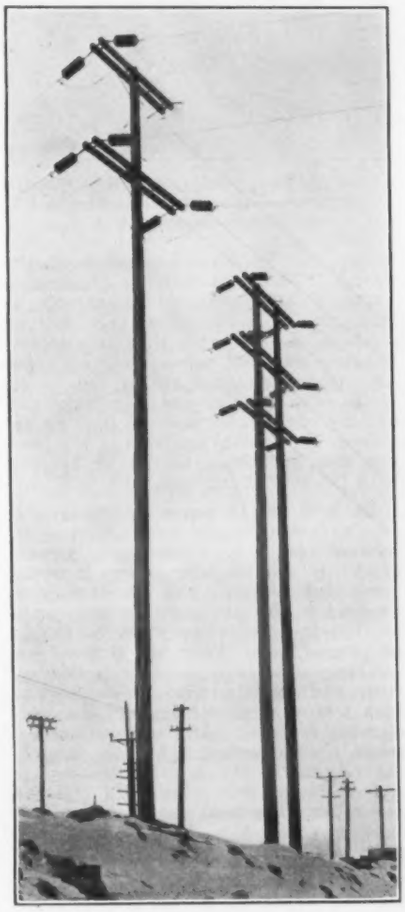


Showing the 60-kv. bus structure and oil circuit breakers at the new East Side substation of The Washington Water Power Company, at Spokane, Wash. It will be noted that all of the structures are of wood. When load requirements demand, a larger station layout will be constructed of steel.

27 kv. The line oil circuit breakers are General Electric Company, 15-kv., FHKO-136, and the transformer breaker is General Electric FHKO-39.

All breakers on the 13-kv. and 60-kv. are operated manually but are designed so that they can later be equipped with motor-closing mechanisms. The breakers are tripped from a 12-volt battery.

The switchboard was furnished by the Western Electric Company and is equipped with Weston instruments. Westinghouse type CO overload relays with two circuits are used, one to trip the circuit breaker and the second circuit for bell operation.



Dead-end structure on 60-kv. line on last pole before entering new East Side substation of The Washington Water Power Company at Spokane, Wash. The span from this tower is slack-sagged to reduce the stresses on the bus structure.

Unsafe Practice to Wear Safety Goggles Over Eyeglasses

By W. E. RICHMOND
San Diego Consolidated Gas & Electric Company, San Diego, Calif.

One of the largest manufacturers of optical goods for some time has been making efforts to put over the idea of fitting safety goggles with prescription lenses. This is sound safety practice and deserves encouragement.

From the safety point of view the workman who has to wear glasses all the time is, because of that fact, subject to greater hazards than the man who normally does not wear glasses. When, because of dangerous work, a man wearing glasses must put goggles on over them, his risk of injury at once increases.

Most men who wear glasses continually, especially those who work over cutting wheels, or other machines, have one pair for work and another pair to wear at home because in one way or another the "work" glasses often are damaged. To put on goggles over the work glasses is never safe practice for mechanical reasons, if no other. Nor can this custom be made safe. However, the fitting of prescription lenses in goggle frames and the exercise of proper care in fitting these frames to the contours of face and head of the man who is to wear them, makes for the utmost in comfort and safety that can be provided by such devices.

Care should be used, too, in fitting goggles to individuals who do not wear glasses. If properly fitted, and comfortable, goggles are more likely to be worn when needed than if they are "too uncomfortable to wear."

Hubby's Part

"You admit that you heard the quarrel between the defendant and his wife?"

"Yes sir, I do," said the witness.

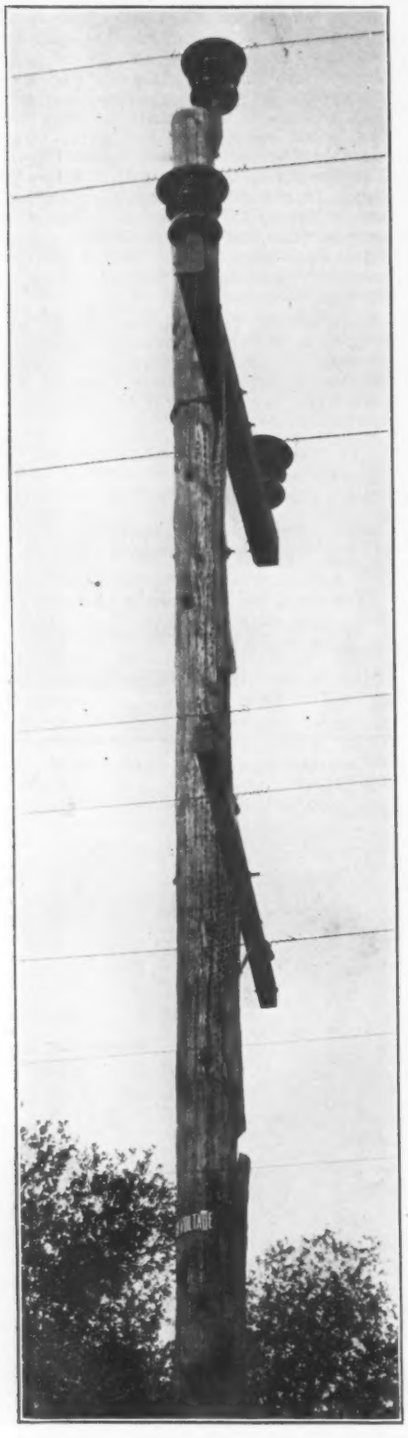
"Tell the Court what the husband seemed to be doing."

"He seemed to be doing the listening."—Two Bells.

Pilot lights on disconnect-switch cell structures at Vaca substation of the Pacific Gas and Electric Company. A red and green light connected in series wih the pilot lights on the switch board in the control room tell at a glance whether the oil breaker on the circuit in question is open or closed. The operator going to carry out switching orders is thus given a check indication as to oil-switch position right where he is to do the switching. It will also be noted that the cells are provided with tumbler locks, the key to which is kept in the operating room. This serves as another safety precaution.

Transmission-Line Pole Nearly Wrecked by Woodpeckers

Many different conditions contribute to the shortening of the useful life of transmission-line poles. By far not the least of these is the species of woodpecker whose native habitat is in the neighborhood of Atascadero, Calif. It so happens that the Midland Counties Public Service Corporation has a 66-kv. transmission line traversing this locality. Further, it is the case that this region is one in which the California live-oak tree flourishes.



Disastrous results caused by ambitious woodpeckers.

The thrifty woodpeckers, being quick to appropriate any and all conveniences placed at their disposal, for several years have used many of the transmission-line poles as storage warehouses for acorns. A typical example of the results of this practice is shown in the accompanying illustration. Due to photographic limitations it was impossible to show the full length of the pole.

It will be noted that the pole literally is peppered with small holes into which have been driven one or two acorns. In addition to this several cracks may be noted. They are due to the swelling action of the acorns that takes place when they get wet. The worst single break in the pole shown does not appear in the picture but is lower down. There is a split which extends from a point about 10 ft. from the ground clear down to the ground line, at which point it involves a third of the pole. Each season this crack is widened by the swelling action of the acorns which later on, in the dry season, contract again and drop down deeper into the split. Following this along comes the woodpecker and again drives the space full of acorns in readiness for the next wet season. The process appears to be limited only by the length of time that the pole will continue to carry its load.

Up to the present time no adequate means of combating this nuisance has been found, although S. F. Platt, district electrical foreman, has given much thought and study to the situation.

Thrust-Bearing Trouble Cured by Greater Oil Pressure

Trouble with a thrust bearing on a 7,500-kw. horizontal turbine unit in an Eastern power plant was overcome by changing the bearing so that the oil supply was received from the hydraulic governor pump instead of from the main bearing-supply line. This trouble at first was attributed to the oil holes in the bearing having been made too small; consequently they were enlarged. As this did not correct the difficulty the style of the bearing was changed, also without success.

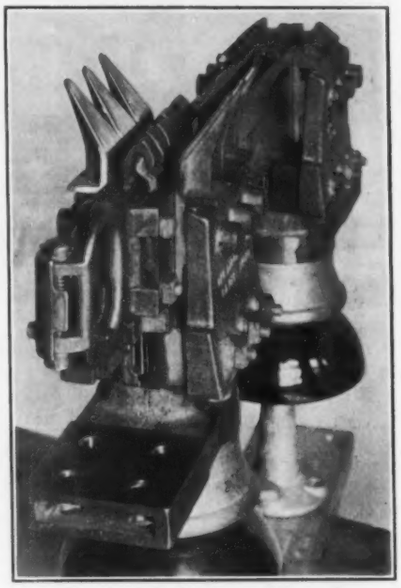
After a more careful study it was found that the trouble was due to dirty steam, which loaded the buckets with mud. Although this mud was removed periodically from the buckets, the bearing trouble continued. A higher oil pressure upon the thrust bearing was recommended. Accordingly the piping was changed so that the supply of oil was taken from the hydraulic gear instead of from the line serving the rest of the bearings. This connection more than doubled the oil pressure at the bearings. Subsequent to this last change no further trouble has been experienced.

Rat Ties Up Carlines.—A 30,000-kw. steam-driven, turbo-generator in the main power house of the Interborough Rapid Transit Company of New York City recently was wrecked by a short circuit caused by a rat gnawing through the insulation of one of the generator leads. The windings were demolished completely, according to the report. The intensity of the current delivered to the short was so great that the oil circuit breakers of several of the generators were damaged in interrupting the current flow. Complete shut-down of the plant for more than an hour resulted.

Disconnecting Switch Completely Full-Floating

Something new in disconnect-switch design has been brought out by the Pacific Electric Manufacturing Company of San Francisco. In an endeavor to overcome the complaint common to this type of switch, namely, its heating under heavy load due to poor efficiency at the contacting surfaces, the new switch has been made entirely "full floating."

This term seems best to fit the case, for none of the contacting parts are fastened rigidly to the main casting at either the jaw- or hinge-end of the switch. The accompanying illustration shows a 3,000-amp., 11-kv. sample of this type of construction. It will be observed in this case that triple jaws are used and that correspondingly there are triple contact shoes at the hinge. Units of a smaller capacity make use of only one or two jaws as may be required. The central contacts of the jaws are also of unique design in keeping with the rest of the unit.



3,000-amp., 11-kv. "full-floating" disconnect switch which is completely self-aligning.

Each of the 12 pieces of the jaws is free to move, within limits, in any direction. In other words, each is independently self-aligning. Thus it would seem that the only thing necessary to produce a 100 per cent contact would be that the contacting surfaces should be ground carefully at the time of assembly. Jaw-pressure is supplied by strap springs fitted into the castings in such a way as not to restrict the self-aligning feature. Electrical contact between each jaw section and the mounting casting is through flexible copper ribbon riveted into place. No soldered connections are used.

The locking clip is actuated to permit the opening of the blade by merely inserting the switch-stick hook through the ring appearing in the central foreground of the illustration in a direction from right to left. This action causes the plate covering this ring to swing on its spring hinge. This plate carries the latch. The company recently has issued a folder describing this device in detail.

A Method of Calculating Electrolysis Depreciation

Means of Determining Rate of Decay in Metals Subject to Electrolysis Offered to Fill Urgent Need

By B. A. WILLIAMSON, Electrolysis Engineer, Los Angeles Gas & Electric Corporation
Los Angeles

The development of all engineering sciences in theory and practice has followed the trend set by commercial requirements and is based upon the discovery and appreciation of basic physical relationships, which progressively become stepping stones. Electrolysis engineering, which is of recent origin, offers no exception to this general rule.

Since electrolysis is a destructive agency the chief commercial considerations have to do with its cause, measurement and mitigation. While the principles involving the cause and cure of electrolysis now are fairly well understood, it has been heretofore difficult, if not impossible, to measure the rate of decay, either from a physical or a financial standpoint. In fact, research work has been directed in the past toward finding this rate from a physical standpoint, that is, finding a means for measuring the current which causes corrosion and the weight of iron this current will decompose. Satisfactory progress having been made along this line, the foundation now is laid to take an advance step to find a means for calculating the rate of decay from an investment standpoint. It is obvious that when a pipe line loses a certain percentage of its weight due to electrolysis there is a depreciation of the investment greatly in excess of the percentage of weight loss. There is an urgent need for a means to figure this depreciation since the question of undertaking electrolysis mitigation and the allowable cost thereof should be decided upon the basis of the depreciation of the investment caused by the vagrant current.

The method of solution submitted in this article is based upon preceding research work to which reference has been made. It will be necessary briefly to review this previous work since it is the starting point for the present investigation.

Faraday, in his well known laws of electrolysis, laid the foundation from which it is known that a direct current of one ampere-year quantity will decompose 20.5 lb. of iron. Present-day research engineers have shown that the above figure is subject to great variation when electrolysis occurs on engineering structures in contact with the soil. The ratio of the actual corrosion under any particular condition to the theoretical corrosion under ideal circumstances is called the efficiency of corrosion and varies from 20 to 140 per cent in saturated soils. (Technologic Paper No. 25, Electrolytic Corrosion of Iron in Soils, by Burton McCollum, Associate Physicist and K. H. Logan, Assistant Physicist.) This work, though valuable, could not be used for calculating electrolytic losses until there was developed a means for measuring the intensity of current discharge per unit of area from the surface to the underground conductor. This troublesome problem now appears to have been met by Burton McCollum, electrical engineer, U. S. Bureau of Standards.

It will be noted that there now exist methods for figuring or estimating the loss in weight due to electrolysis. This includes a means for measuring the current being discharged and permits the assumption of an average figure of the loss in weight per ampere-year. This method is of little value other than as a basis from which to figure the financial loss. This fact must be apparent when it is considered that the life of a pipe is spent when it will no longer confine a gas or fluid under pressure and that electrolysis in its corrosive action is more comparable to a drill press than to a lathe.

There remains the problem of the unequal distribution of electrolysis or the "pitting effect." It is desired here to suggest that the American Committee on Electrolysis, or other parties who may be in a postion officially and otherwise, consider the "pitting" phenomenon with special reference to the subject of depreciation. Until a better way may be found, the following method is offered:

The ratio of the initial weight of a pipe to the loss of weight due to vagrant current to the time for its breakdown is called the "factor of electrolytic concentration." For a 2-in. wrought-iron pipe it was determined in the following manner: A pipe weighing 37.5 lb. capped and made air-tight, was installed and subjected to electrolysis in the ground. Air was introduced under pressure through an auto-tube valve. When the pipe broke down, as evidenced by its no longer holding air pressure, it was removed, cleaned and reweighed. It was found that the loss of weight was 2.5 lb. Hence the "electrolytic concentration" was $37.5 \div 2.5$, or 15. This is interpreted to mean that a 2-in. wrought-iron pipe line when subjected to electrolysis may be expected to be no longer serviceable after having lost 1/15 of its initial weight. In other words, while the corrosive action of one ampere-year quantity of electricity is in the neighborhood of 17 lb. of iron, where the efficiency of corrosion is assumed to be 85 per cent as an average, the effective corrosive effect in depreciating the investment is 15 times this rate, or 255 lb.

Proper Use of Fire Extinguishers Shown by Placards

By W. E. Richmond
San Diego Consolidated Gas & Electric Company, San Diego, Calif.

With the usual profusion of various types of fire extinguishers that collect around an old station during its operating life there is danger of them being put to the wrong use. At one particular station in southern California there is a collection representing 10 styles and 3 different types. Two of these types are suitable for use only on fires of other than electrical character or origin. The third is useful for all fires. None of these extinguishers ever should be used on a human being except in the direst emergency.

To obviate the possibility of incorrect usage a plainly marked legend has been prepared and mounted in a suitable protecting frame to be hung prominently at each extinguisher station. Through the use of these signs and by trying to mount extinguishers of a type suited to certain uses near to the equipment or apparatus which might necessitate their use, much difficulty has been overcome.

TETRACHLORIDE

For Electric Fire

And Any Other Fire

SODA ACID

Not for Electric Fire
(Contains Water)

FOAMITE

Not For Electric Fire
(Contains Water)

For Any Non-Electric Fire And

Especially For Oil Fire

The small wooden frames used for these signs are about 4 x 6 in. in size. Each is fitted with a screw-eye or two small hooks, depending upon which is the more convenient for the location of each sign. The different signs are shown in the accompanying illustration. Visual prominence may be obtained by using sharply contrasting colors.

Electrically Speaking

"Are you Mr. Pere?"

"Yes, I am Pere."

"Volt is my name, sir."

"Well, wire you here?"

"I'll cut it short, cir-cuit I marry your daughter?"

"No. I'll be switched if you can! And until I get a line on you I forbid you to meter again."

"Arc, sir! Brush me not aside! You can't phase me!"

"What! How dare you make light of my resistance?"

"Because I love Dyna mo' than oil the world, sir, and we are engaged."

"Engaged? Humph! How can you keep her in the station she's juice to?"

"Well, sir, we'll make our ohm with you, sir."

"I get you. Just step upstairs ammeter mother, Volt. Age is no interference if you can transformer opinions. But she's ill, so don't exciter."

"Thank you, sir. And no matter watthour current bills may be in the future I'll carry my peak of the load."

—Synchronizer.

IDEAS FOR THE CONTRACTOR

Melting Pots and Ovens Are Heated Electrically

Working Conditions Improved and Fire Hazard Decreased by Use of Electricity in Brush Factory

The use of electricity in manufacturing high-grade brushes was adopted by the Wolfe Brush Company, Pittsburgh, Pa., in 1919 for heating melting pots and ovens, and the step has been justified completely. It is felt that electric heat is helping maintain the quality standard and removing some of the cares and troubles of the manufacturing processes.

In the manufacture of brushes the composition which fastens each bunch of bristles into the holes in the wooden back is heated in a cast-iron melting pot, 18 in. in diameter and 8 in. deep, mounted in the middle of a work table. Three Westinghouse steel-clad heaters having a total load of 1,950 watts are fastened to the bottom of this melting pot. Asbestos cement 1 in. thick insulates the pot and conserves heat; this insulation is protected by a galvanized iron shell. Air is exhausted from over the top of the pot through a 4-in. galvanized pipe by means of a ventilating fan. The heat is controlled by a three-heat snap switch. The composition is melted on a high heating rate in the morning and then kept at the proper working temperature on a medium heating rate.

Since electric heat superseded gas for this process working conditions have been improved greatly, and fire hazard has decreased. Electricity provides a constant and uniform source of heat energy, which is advantageous.

The electric oven used for baking the brushes superseded a gas-fired oven. Electricity provides a reliable means of maintaining the proper temperature with a maximum amount of convenience and safety.

The ovens are used for vulcanizing the compound in which the brush bristles are set. The bristles first are arranged in thin metal ferrules with the root ends projecting about ½ in. The roots are dipped in cement and the ferrules then are slipped over them far enough to allow the proper insertion of the handle after the cement has been baked. The baking is done with the bristles in an upright position.

In order that the high quality of these brushes may be maintained, it is necessary that this baking be done at the proper temperature. Over-heating destroys the life of the bristles and makes them break off. It has been found that electric heat permits maintenance of a very close temperature regulation, between 216 and 230 deg. F.

The average charge consists of about sixty dozen brushes, weighing about 250 lb. per bake. The brushes are placed in the oven in the morning and baked ten hours. About three and one-half hours of this time is required for heating up. Before electric heat was adopted it was found that it sometimes took three or four days per bake in periods of low gas pressure. Since electric heat has been installed there have been no delays.

Electricity Is the Safest Form of Light, Heat and Power

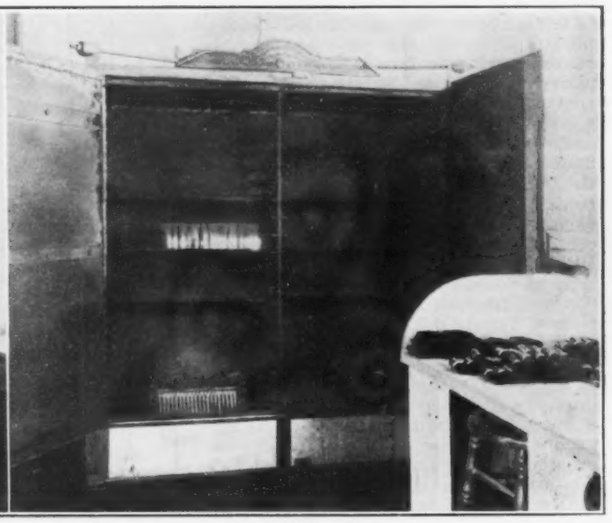
Electricity is regarded as the safest form of light, heat and power by the National Board of Fire Underwriters. The following statement appeared in the report for the year 1923 that was recently published by them:

"Electricity, than which there exists no safer form of light, heat and power, when it is properly installed and used, exacted a toll amounting to $14,091,789. Hence, despite an actual jump of more than two millions it dropped back from fifth place where it reposed in 1922, to sixth, exchanging positions with Sparks on Roofs. In 1923 the boon of electricity was most grossly abused in Massachusetts where $1,175,420 in property was swept away. New York was the other "seven figure state."

"Of all the scores of ways in which electrical fires can develop perhaps none is so common as the condition usually termed 'crossed wires,' unless it be a broken connection or abrased insulation. By running electric wires through metal conduit, to begin with, much of the risk is eliminated. 'Doctored' fuses and overloaded circuits frequently cause trouble, too, as do extensions employing flexible cord wiring, which may easily be rubbed bare."

H. H. Fenneman has recently taken over the Ralph W. Reed Electric Company, electragists of 501 Castro Street, Hayward, and has changed the name to the Hayward Electric Company. The business will be that of contractor-dealer and will also display lighting fixtures. The plumbing business will be discontinued.

Electrically heated melting pot used for melting the compound that holds the bristles in the wooden holes



Electrically heated oven used for baking brushes. The maximum charge consists of 1,440 brushes. The length of bake is ten hours

Letters from a Secretary to a Self-Made Contractor

The First of a Series of Communications from a Man of Experience to His Friend Just Starting Out

San Francisco, Calif.

Dear Bill:

You have started out in life in your chosen work. I hope that you will enjoy your vocation and will prosper. Whether or not you do one or both of these things will depend largely upon yourself. If you respect the fundamental principles of business and conduct yourself with due regard to the rights of yourself, your customer and your competitor you are very likely to succeed. If you do not so conduct yourself I predict for you an early oblivion, for no man can break faith with his fellows and long survive. Unfortunately, the history of the electrical contracting business is filled with the records of untold thousands who have tried to business. However, I hope you will avoid the common errors of trying to beat down the quality of installation and of keeping the estimate so close to your cost that the profit is liable to be written in red ink instead of black. Just that little procedure has been the cause of many of those afore-mentioned wooden crosses. The fear of the general contractor and of the lower bid has driven many a well-intentioned man to the quicksands of low-priced competition. The result has inevitably been the same—a short life and a quick death.

The handwriting is on the wall, and all may read. The business death rate for electrical contractors as determined from Oakland, Calif., figures, for example, shows that—

26 or all	of the 26	contractors	who started in	1924 are still in business.
Only 26 or 50 per cent	of the 52	"	" "	" 1923
Only 20 or 34 per cent	of the 59	"	" "	" 1922
Only 21 or 30 per cent	of the 71	"	" "	" 1921
Only 9 or 26 per cent	of the 34	"	" "	" 1920
Only 6 or 17 per cent	of the 37	"	" "	" 1919
None	of the 16	"	" "	" 1918
6 or 13 per cent	of the 48	"	" "	" 1917
5 or 12 per cent	of the 43	"	" "	" 1916
2 or 5 per cent	of the 38	"	" "	" 1915
19 or 14 per cent	of the 135	"	who started prior to 1915	are still here
140 or 25 per cent	of the 559	who started	are still so-called electrical	contractors

All of which means that for every 100 contractors who start in business:

50 will be forced to quit during the 1st or 2nd year which will leave 50
16 more will cash in during the 3rd year which will leave 34
4 more will fold their tents in the 4th year which will leave 30
4 of those left will pass on in the 5th year which will leave 26
9 will be mourned by the jobbers in the 6th year which will leave 17

and so on until after nine years only five will be struggling where 95 took the count.

"beat the game" by skinning the job and everything else. They have even tried—successfully, for a while—to skin their customers. However, it takes longer to recover from the smart and sting of a bruise than it does to inflict the wound and the recollection of a "trimming" has lasted a long time in the memory of the customer. That accounts for the long lanes of wooden crosses in the business burial ground inscribed with the names of electrical contractors who have been suffocated by an unsavory reputation or have been annihilated by unbusinesslike tactics. You know that you may beat the doctor all your life but you cannot dodge the undertaker.

I do not want to preach to you for it wouldn't do any good; you will probably have to learn by experience. It is rather queer that normal human beings, in possession of their faculties, are not willing to learn from the experiences of others but that seems to be the case. Therefore, I presume you will make some of the same mistakes that have been made by many others in your

The fifty who quit in the first or second year claimed they "didn't have any overhead" . . . and now they haven't anything else either; the sixteen "wise guys" thought cost plus 10 per cent would "get by," but the jobber closed the accounts in red ink during the third year; the four who finished in the fourth year figured labor and material plus 20 per cent, so they stuck it out a year longer than the sixteen; the next four added 25 per cent to cost and lasted five years. Cost plus 30 per cent sounds like it's plenty, but the next nine can tell you it's only good for six years.

But the five who will last ten years or longer are the ones to follow. Study their methods and you will find that:

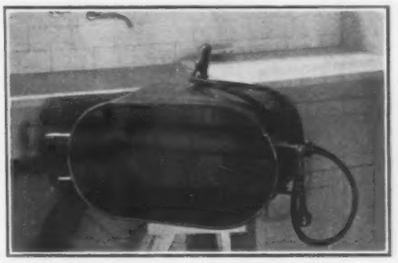
They **never** do a **big** volume for that's quick poison. They **never** "go down after" any job because they are **not** philanthropists. They **figure** labor and material plus 50 per cent, which will make a profit. They take an active interest in ASSOCIATION WORK.

Profit by these examples or you will follow in the steps of the 419 wise guys.

JOE MAGEE.

Contractor Makes Electrically Heated Water-Boiler

The problem of boiling clothes in connection with the family washing is one which frequently has confronted contractors in selling complete electrical homes. The problem recently has been successfully met by Clyde Chamblin of the California Electrical Construction Company of San Francisco and Oakland. Working in conjunction with W. Wesley Hicks, electrical manufacturer



Electric water-boiler showing heating unit and attachment cord. The draining faucet on the bottom of the boiler appears at the top of this picture.

of San Francisco, Mr. Chamblin constructed an electrically heated wash-boiler.

A 3-kw. 220-volt Wesix water-heater unit was installed in a copper tube which was placed in the lower part of an ordinary copper boiler. One-inch clearance from the bottom was allowed for circulation. An attachment cord and plug provide for the connection of the heating unit to a 220-volt convenience outlet. A faucet for draining the water was installed at the bottom of the boiler. This boiler has been in use for some time and is entirely satisfactory.

Creation of Three New Sales Divisions Announced by National Lamp Works.—Due to rapid progress in electrical development in the southern, southwestern and northern sections of the country, the National Lamp Works of the General Electric Company has formed the following new sales divisions: Southern lamp division, with headquarters at Atlanta, Ga., H. E. Huff, formerly in charge of the Cleveland district, general manager; southwestern lamp division, Kansas City, Mo., H. F. Viot, formerly manager of the Chicago district for the Shelby lamp division, general manager; and northern lamp division, Minneapolis, Minn., O. F. Stuefer, formerly of the Federal miniature lamp division, Chicago, general manager.

New Small Electric Range Placed on Market.—To meet the demands of apartment-house owners and the desires of a small family the Edison Electric Appliance Company, Inc., has placed on the market a new electric range that measures 24½ x 45 in. The range is equipped with two 1,000-watt hot plates and one 1,800-watt hot plate. Oven linings are full enamel of pebbled blue finish. New type of vent outlet and oven temperature control have been installed in the range. Radio-dial adjustment has been provided for oven-temperature control. The range may be secured with either open or enclosed elements.

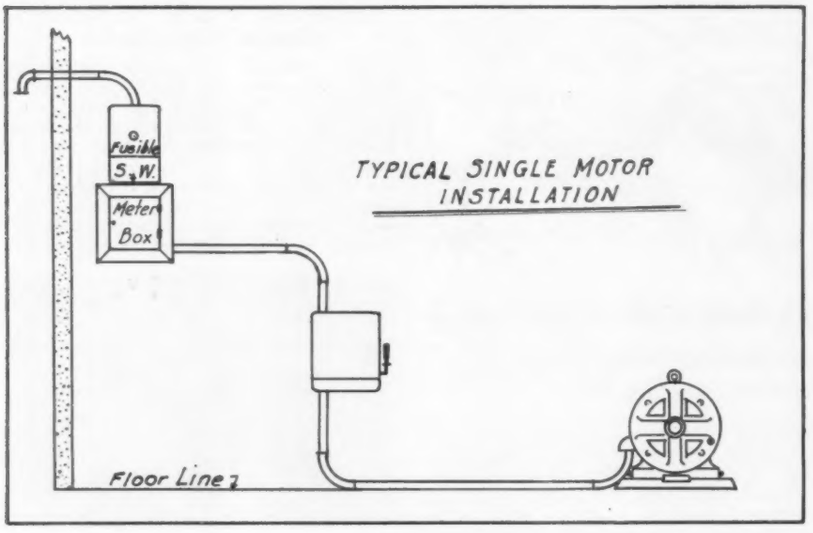


Fig. 1.

Safety-First Installations for the Electrical Contractor

California has been working for some time now under the Electrical Utilization Safety Orders of the Industrial Accident Commission of the state, and most contractors are quite familiar with the various orders as well as the changes that have been made from time to time.

The contractor doing building as well as industrial work usually employs men that are more or less experts in one line or the other, and when an industrial job comes up he places an industrial wireman on the job. This type of man is usually thoroughly familiar with the method of installing apparatus in a safe manner, but the man that is not thoroughly acquainted with the rules may not know just what should be done under certain circumstances.

Again, there is the contractor who has the same class of men that he uses on industrial as well as building installations, and these men take care of anything that happens to be the contractor's good fortune to install.

In order to keep clear in mind some of the more simple installations, the Journal of Electricity plans to show five different types of them laid out in simple form so that it will be easy to pick out the method for such installations.

Fig. 1 is the first of a series of five to appear in succeeding issues of the Journal of Electricity. It shows a single motor installation with all apparatus in sight of the operator; that is, the motor, the disconnecting switch and the starter. It will be noted that the incoming service enters the fusible disconnecting switch just above the meter box, thence to the starter, and on to the motor. The operator can trip the auto-starter and see if his disconnecting switch is in the open or closed position before he attempts to work on the motor or any connections included in the installation.

Contractors Make Valuable Use of Membership Lists

The Electrical Contractors and Dealers' Association of Los Angeles has made good use of a four-page pamphlet listing the names of the members, their addresses and telephone numbers. The front cover carries a message to the public stating the principles for which the association stands. The back cover gives a list of suggested electrical service for the home, containing outlets for the porch, kitchen, breakfast room, bedrooms, hall, reception hall, bathroom, dining room and living room. In a number of instances the height at which the outlet should be installed is suggested.

These lists are distributed from the Electric Club and by manufacturers, jobbers, and others in the industry. The association office, the members and the journeymen are the principal sources of distribution.

The K & R Electric Corporation is the name of the new firm recently incorporated with L. A. Kaplan, president, J. Kapelus, vice-president, and J. Rosenthal, secretary-treasurer. It has opened a new sales and display room at 2231 West Washington Street, Los Angeles, and will specialize in electrical contracting and electric-fixture manufacturing.

The Newberry-Pearce Electrical Company of San Francisco has been awarded a contract by the board of trustees of Healdsburg, Calif., to furnish and install a complete electric lighting system in the business district of that city. Forty-eight electroliers are to be erected. The system will cost the city $11,122.50. Work on it will begin at once.

Electrical Service Suggested for the Home

PORCH
- Convenience Outlet for ironing machine motor—up 3'
- Convenience Outlet for washing machine—up 3'.
- Convenience Outlet for refrigerator motor—up 6'.
- Convenience Outlet for electric flat iron—up 3' 6"
- Convenience Outlet for ironing machine heater—up 3'

KITCHEN
- Convenience Outlet for water heater—up 18"
- Convenience Outlet for utility motor.
- Bracket Light over sink.
- Convenience Outlet and Switch for dishwasher.
- Front door bell.
- Back door buzzer
- Switch for range—up 4'
- Range Outlet—up 30"

BREAKFAST ROOM
- Convenience Outlet for heater.
- Convenience Outlet for toaster, percolator, etc.

BEDROOMS
- Outlet for dresser lights.
- Convenience Outlet for heater, sewing machine, or vacuum cleaner.
- Convenience Outlet for reading lamp, warming pad or milk warmer.
- Convenience Outlet for curling iron.

HALL
- Outlet for all night light

RECEPTION HALL
- Convenience Outlet for vacuum cleaner.
- Convenience Outlet for portable lamp
- Telephone Outlet.

BATH ROOM
- Convenience Outlet for vibrator, curling iron, hair dryer or shaving mirror—up 4".
- Convenience Outlet for heater—at base.

DINING ROOM
- Convenience Outlet for stand lamp.
- Floor Outlet for toaster, percolator, etc.
- Convenience Outlet for heater.

LIVING ROOM
- Convenience Outlet for piano lamp or phonograph.
- Convenience Outlet for stand lamp.
- Outlet for lights on mantel.
- Floor Outlet for table lamp.
- Convenience Outlet for heater.
- Convenience Outlet for vacuum cleaner.

QUALITY SERVICE ELECTRICAL CONTRACTORS & DEALERS ASSN. Los Angeles RESPONSIBILITY

The Electrical Contractors & Dealers Association of Los Angeles

Composed of those Electrical Contractors and Dealers who stand for quality, service, responsibility and fair dealing, are firmly committed to the policy of the AMERICAN PLAN, as established by the Merchants & Manufacturers Association of Los Angeles. Your favorable consideration of those who stand for this great AMERICAN principle of industrial freedom, is respectfully requested.

First and fourth pages of pamphlet containing list of members of Los Angeles contractors' association. The first page is on the right of the dividing line. Note the electrical service suggested for the home. The reverse side of this sheet contains the list of members.

Architect's sketch of Beaty Building, Modesto, Calif., which will be heated by electricity.

Modesto Office Building to Be Heated Electrically

An office building, which it is believed will be the first one in California to be heated by electricity, is being erected in Modesto, Calif., by Jack Beaty. The structure will be a four-story brick and concrete building devoted to offices and store rooms.

The Beaty Building will have a frontage of 140 ft. on J Street and 100 ft. on Eleventh Street and will contain twelve stores and ninety offices. It will be possible to meter any group of stores or offices separately. Wallace H. Hubbert and Wieland Bros., Associated, of San Francisco and Modesto are the architects.

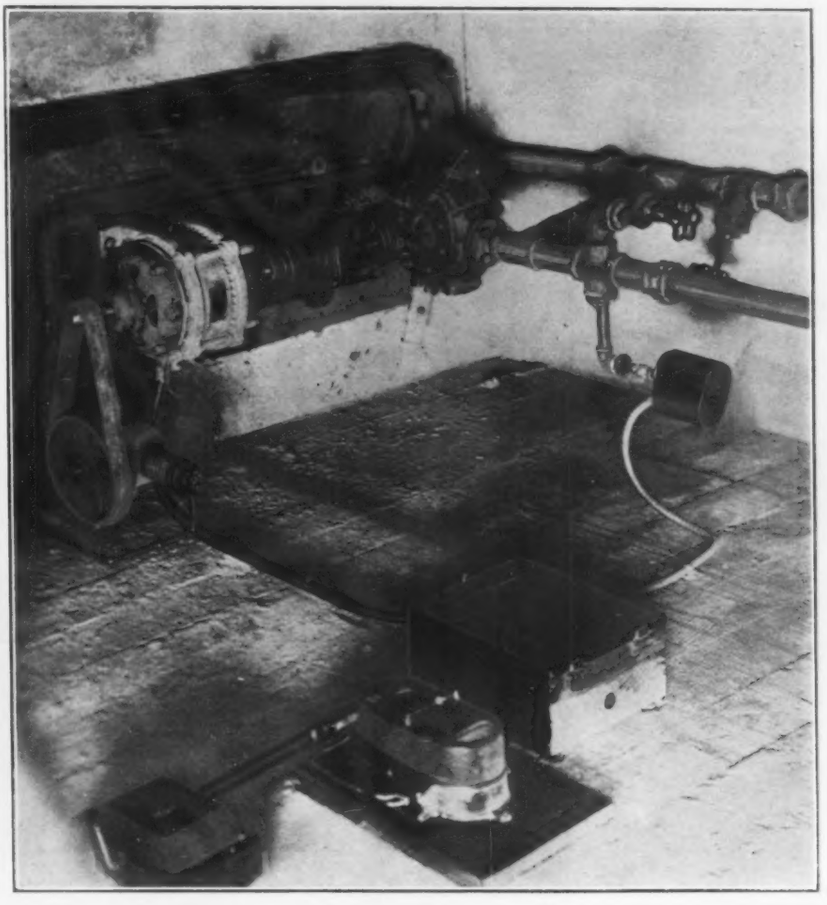
California Contractor Uses Word "Electragist" to Describe His Business.—The use of the word "Electragist" to describe the man engaged in the business of electrical contracting rapidly is becoming a reality in California. Roy Butcher of San Jose recently has had his name and address and the word "Electragist" painted on each side of his cars. This is the only description of his business that appears. Mr. Butcher believes that in this way people will realize more quickly the value of the trade name, and if they ask what an electragist is he has a splendid opportunity to sell the idea to them.

Panel on automobile of Roy Butcher, used to advertise the fact that he is an electragist

P. E. Doran, electrical contractor-dealer of Hollywood, Calif., has recently opened a new branch store at 8030 Santa Monica Boulevard, Hollywood. R. B. Patton, who has been associated with Mr. Doran for some time, will manage the new branch. The main store is on Hollywood Boulevard.

The Ohio Electric & Controller Company, Cleveland, recently has issued Bulletin No. 107 describing Ohio lifting magnets and discussing and illustrating their use in the iron and steel trades, also for magnetic separation of tramp iron from ore, cement, coal over conveyors or chutes, and their profitable application for handling pipe in warehouses, rails, billets, as well as iron, steel and scrap in bulk.

Pump Used for Supplying Irrigation and Pressure Tank Service.—The accompanying picture shows a 1¼-in. Type FD Pelton pump direct-connected to a 5-hp. U. S. motor installed in a concrete pit on the ranch of Fred Moffet, Ceres, Calif. The pump lifts water from 70 ft. to 123 ft. for irrigation and pressure tank service. The extended end of the motor shaft is used for belt-driving a small compressor. An automatic control switch may be noted near one of the discharge pipes; this starts or stops the motor as the water pressure reaches certain predetermined points. Note also the check valve which makes it possible to retain the tank pressure even though the pump is being used for irrigation service.



Electrical installation in a pit on a California ranch showing pump, motor, compressor and control equipment

BETTER MERCHANDISING

Record in Kitchen Unit Campaign Made by Idaho Company

What is believed to be a record in the Northwest in a kitchen-lighting campaign recently was made by the Idaho Power Company, Boise, when it sold 3,666 kitchen-lighting units in its field in southern Idaho and eastern Oregon where it serves 22,000 residence lighting consumers. This means that sales were made to over 16 per cent of the residential customers.

By way of stimulating interest in the campaign, contests were put on among employees of the company, with the result that in several towns on the system more than 40 per cent of the residences were equipped with kitchen units. Units were installed on a 15-day free trial and sold on terms of 75c down and 75c per month.

One of the window displays used by the Idaho Power Company to stimulate interest in its recent kitchen-lighting campaign.

SAM SHARP OUTSHARPED
Easy Come—Easy Go

By JOE OSIER.

"A city that is built upon a hill cannot be hid" nor can a business based on double-dealing, trickery and sharp practices prosper for long. Sooner or later the submerging tide will set in, the waves of adversity roll high, break and recede carrying along the wreck of the institution and the owner who believed his iniquitous actions were hidden from the sight of his fellowmen.

Years ago Sam Sharp's electrical shop and store resembled the First National Bank at the Saturday rush hour. Customers were trampling one another into the terrazzo to get to the counter to spend their spondulicks and Sam—

Was growing round-shouldered from toting tin from his till.

"S'nothin' to't," says Sam. "S'like shootin' fish in a cistern. All a man needs to succeed in the 'lectrical game is an up-to-date store and shop, first class merchandise, A-1 salespeople, high-class workmen and advertising. I'll be golfing with John D., first thing I know."

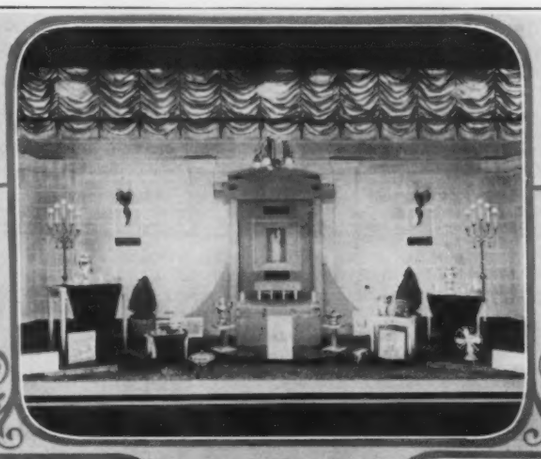
And Sam's sayings were not idle boasting. He was riding on that beautiful boulevard leading to the Vista House, and everything was eggs in the coffee until—

THE GOBLINS 'LL GET YOU IF YOU DON'T WATCH OUT!

He began to figure that he was giving his customers and his trade too much of a break. "My stock is too high-class," he figured. "I'm not getting enough velvet. I'm paying too much in salaries. I'm not grabbing mine fast enough," and, so—

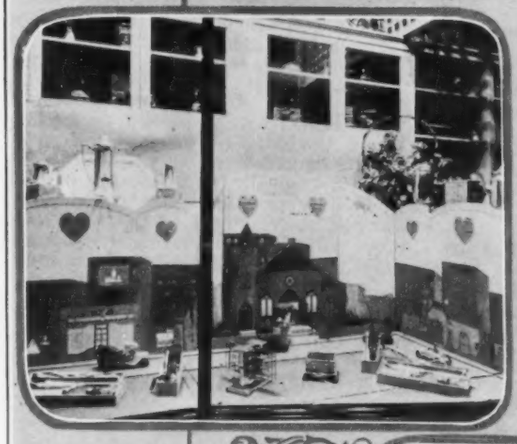
Sam Sharp, a man of the industry who had for years carried the light and been an example for many friendly competitors, executed a right-about face, heading directly in the opposite direction.

And the city that he had builded on the hill was an abomination, and men of the electrical industry, lifting their honest eyes from their tasks, looked upon Sam's city and Sam's folly and profited greatly thereby.



They Sold Gifts for June Brides

THE window displays in this group were used last year by California electrical dealers to call the public's attention to June Bride Week. The ideas in window decorating may serve as aids to those dealers desiring to put electrical devices in the new home of the June Bride of 1925. The experience of past years has proved the drawing power of the specially decorated displays which have increased consumer interest in the modern electrical appliances.



NEWS OF THE INDUSTRY

San Joaquin Company Announces 1925 Development Plans

The expenditure of $8,000,000 and the construction of a 28,500-kw. hydroelectric plant are included in the 1925 development program of the San Joaquin Light & Power Corporation as announced by A. Emory Wishon, vice-president and general manager. In this year's budget $1,250,000 has been alloted for construction work on the Balch plant of the Kings River project. (Journal of Electricity, April 1, 1925, p. 241.) This plant will cost $5,000,000 and be ready for operation Jan. 1, 1927.

In addition to the work on the new power plant, the expansion program includes the building of several new substations of large capacity, the enlarging of others and the construction of hundreds of short transmission and distribution lines throughout all parts of the ten counties served. Business and agricultural conditions in the San Joaquin Valley are recovering rapidly from the depression of 1924, and bumper crops have been assured by ample rainfall.

More agricultural load has been connected to the lines of the company this year than in any similar period in the history of the company. During the first three months of 1925, 11,000 hp. in agricultural motors was added, an increase of nearly 3,000 hp. over the same period of last year. During the coming year the company will have available 25,000 hp. from the Exchequer plant of the Merced Irrigation District. A contract looking toward this source of power was made several years ago. This will meet the growth in load until the completion of the Balch plant.

Tentative Electrical Safety Orders Hearing Dates Set

The Industrial Accident Commission of the State of California, Department of Safety, has prepared tentative Electrical Safety Orders for submission at public hearings, as required by law, before becoming effective. These orders are the result of the experience gained from a practical tryout of the "Proposed Electrical Safety Orders," which have been applied quite generally throughout California since they were distributed in 1922. They represent the work of the advisory electrical committee and the commission's engineers, who have been at work on them for many months. The rules apply to all work done by public utilities on private property, such as services, meter installations, industrial substations, etc., in addition to all electrical work done by electrical contractors. The public hearings will be held at 10 a.m., May 26, in room 137 State Building, Civic Center, San Francisco, and at 10 a.m., June 2, in Room 906 Pacific Finance Building, Los Angeles. After the hearings, the necessary changes and corrections will be made, and the Orders then will be printed in the adopted form.

The Electrical Safety Orders will supersede the Electrical Utilization Safety Orders, effective Jan. 1, 1917, and as revised July 1, 1917. and will be effective in places of employment over which the Industrial Accident Commission has jurisdiction.

A limited number of the tentative orders were printed and are being distributed. Copies will be reserved for the public hearings, and those who attend these hearings and who have not received the tentative orders will be supplied with a copy at that time. It is suggested that all interested in this work attend the public hearings and gain a first-hand knowledge of the requirements for safety which the Industrial Accident Commission proposes to make effective.

Mystic Lake Plant of Montana Utility Put in Operation

The Mystic Lake plant of the Montana Power Company recently was put in operation. The energy being furnished to Billings and the entire eastern section of the company's system, which hertofore has depended solely on power supplied from the more remote plants at Great Falls and on the Madison River, will be augmented by the power generated at the Mystic Lake plant which has a 10,000-kw. capacity.

This plant, which is situated on the West Rosebud River, 45 miles south of Columbus, Mont., is operated under an effective head of 1,050 ft. A dam 25 ft. high impounds 20,000 acre-ft. of water, which is brought to the 2,800-ft. steel penstocks through a tunnel 1,000 ft. long and a 56-in. wood pipe 9,000 ft. in length. Plant equipment consists of two 7,500-hp. Pelton water wheels connected to two Westinghouse 6,250-kva. generators, and two Westinghouse 3-phase, 6,000-kva. transformers. A 51,000-volt transmission line has been erected to Red Lodge, a distance of 27 miles.

California Institute of Technology Conducts Strength Tests.—Strength tests to last approximately a year or more now are being conducted on different types and makes of suspension insulators (high strength) at the high-tension laboratory of the California Institute of Technology, Pasadena, Calif. Apparatus has been set up by which four different loadings are put on these insulators until a failure occurs. Both short-time and long-time load tests are made to test the ultimate strength of the units, and all units so loaded are given periodic electrical tests. This important work will have a bearing on the equipment to be used on the construction of the Southern California Edison Company's new Big Creek 220,000-volt line.

Faculty for Pacific Coast Truck School Is Announced

Definite plans for the Electric Truck School to be conducted under the auspices of the National Electric Light Association in San Francisco, June 8-13, are nearing completion. The faculty for the school has been partially determined upon and includes the following nationally known men: Charles A. Skinner, New York Edison Company; B. J. Martin, Commonwealth Edison Company; George E. Cole, Commercial Truck Company; S. A. Freeman, vice-president, Walker Vehicle Company; J. C. Boyers, sales manager, Ward Motor Vehicle Company; and G. A. Round, Vacuum Oil Company. Other prominent men interested in the development of the electric truck industry have signified their intention of being present during the duration of the school, which will be held just prior to the National Electric Light Association convention.

The curriculum of the school has been prepared and will include the following topics:

Charging Equipment.
Motors and Controls.
Maintenance and Repairs.
Fleet Operation.
Truck Lubrication.
Garage Management.
Salesmanship.

The school will be opened June 8 by Frank A. Leach, Jr., vice-president and general manager of the Pacific Gas and Electric Company, and president of the Pacific Coast Electrical Association. During the remainder of the week lectures will be given during the afternoons, the mornings being given over to the inspection of equipment displays and fleets in the San Francisco Bay region. This arrangement will permit those who desire to attend the Industrial Heating School, which will be held in the mornings from June 9-13.

The truck school will be held in the new general office building of the Pacific Gas and Electric Company. Enrollment in the course should be made through J. L. Farley, Pacific Gas and Electric Company, San Francisco.

Grays Harbor Company to Develop Power on Olympia Peninsula.—The Grays Harbor Railway & Light Company of Aberdeen, Wash., will develop hydroelectric projects on the Olympic peninsula, even if the city of Aberdeen decides to develop a similar project on the Wynooche River, according to E. N. Sanderson, president of the Federal Light & Power Company of New York, of which the Grays Harbor company is a subsidiary. The company has made surveys, Mr. Sanderson states, on the Wynooche, both forks of the Quinault and on the Queets and Hoh watersheds, and has filed on the Queets, Hoh and Quinault Rivers.

Contracts for Largest Turbines and Generators Signed

Contracts for hydraulic and generating units for the Rio Itapauhau plant of the Sao Paulo Tramway, Light & Power Company, Sao Paulo, Brazil, have been signed recently. The Pelton Water Wheel Company, San Francisco, will supply two 40,000-hp. impulse turbines and the International General Electric Company has been awarded the contract for the two 28,050-kw. horizontal generators. The hydraulic units will create a new world's record for capacity, the former record having been held by a Pelton 35,000-hp. wheel in the Big Creek No. 1 plant of the Southern California Edison Company. The generators will be the largest horizontal units ever made.

Sao Paulo is the center of Brazilian industry, which is made up of a diversified line of manufacturing. It is approximately 50 miles from the city of Santos, an Atlantic seaport on the southeastern coast of Brazil. The shipment of hydraulic equipment will aggregate 500 tons which will be transported by an all-water route to Santos, whence it will be hauled by rail and truck to the power-house site.

Each of the two turbines, operating under a 2,230-ft. head, will be direct-connected to a generator rated at 33,000 kva., 11,000 volts. The generator voltage will be stepped up to 88,000 volts for transmission to Sao Paulo and vicinity.

Mansfield Will Be Westinghouse Merchandising Center

In order to place the head offices of the merchandising department of the Westinghouse Electric & Manufacturing Company near the site where most of the articles handled by the department are produced, that department has been moved recently from New York to Mansfield, Ohio. In the future all of the activities of this branch of the Westinghouse company will be directed from Mansfield.

J. S. Tritle, formerly manager of the merchandising department, has become general manager. Mr. Tritle has moved his headquarters from New York to Mansfield, from where he will direct all merchandising activities. As the majority of the articles included in the merchandising department are produced at the Mansfield works, Mr. Tritle will have his headquarters in that city and the manufacturing, engineering and sales forces located at that point will report to him directly.

Heretofore the engineering and manufacturing operations have been supervised by officers located at East Pittsburgh, while the sales activities have been directed from the merchandising headquarters in New York. All engineering work will be conducted in Mansfield under the supervision of Mr. Tritle. Those engineers at East Pittsburgh who have been engaged on the products made in Mansfield will be moved to the Ohio plant.

Mountain States Company Enlarges Operations by Purchase

Enlargement of the scope of operations of the Mountain States Power Company, Albany, Ore., is made known through the recent announcement of the purchase of the Natrona Power Company, Casper, Wyo., (Journal of Electricity, May 1, 1925, p. 341), the municipal distribution system at Wheeler, Ore., the Sublimity Light & Power Company, Sublimity, Ore., and the Aumsville Light & Power Company, Aumsville, Ore.

The towns of Sublimity and Aumsville, Ore., are in Marion County not far distant from Stayton, the light and power business of which was purchased last year by the Mountain States company. The newly purchased properties will be tied in with Stayton by an 11,000-volt line. The town of Wheeler, Ore., on upper Tillamook Bay, will be served from the system of the Coast Power Company acquired recently by the Mountain States company.

Chain of Utilities Is Formed in Rocky Mountain Region

Another chain of light and power companies has been organized in the Rocky Mountain region, the formation of which has been announced by E. P. Bacon, vice-president and general manager of the Natrona Power Company at Casper, Wyo., until the recent absorption of that company by the Mountain States Power Company. The new company is known as the Midwest Public Service Company and already has been chartered to operate in Wyoming and South Dakota.

H. C. Chappell, formerly Mr. Bacon's assistant in the Natrona company, is associated with him in the new arrangement as general manager of the company. It is understood that Salt Lake City capital is behind the new organization which has assumed control of the Big Horn Utilities Company, Greybull, Wyo., the Western Utilities Company, Edgemont, S. D., and the Platte Valley Power Company, Valley, Neb.

Operating headquarters of the company will be maintained at Casper although plans contemplate the extension of activities to every state in the Rocky Mountain region as well as western Kansas and Nebraska.

Aberdeen Employs Skagit Engineer.—The city of Aberdeen, Wash., has retained C. F. Uhden, formerly engineer in charge of the Skagit River power construction for the city of Seattle, to make a survey of the Wynooche hydroelectric project, supplementary to the report made by S. C. Watkins, water superintendent. Mr. Uhden is expected to make a report in the near future to the mayor and city council of his findings, which will include additional data as to water volume from gages he has placed in the river, and also as to the amount of timber to be taken out and cost of logging. In the meantime, the state supervisor of hydraulics is still to report on the application of the city for water and power rights, which he took under consideration after a hearing a short time ago (Journal of Electricity, April 15, 1925, page 297).

Application Filed for Appropriation of Water from Feather River North Fork Tributaries—Application has been filed with the California Department of Public Works, Division of Water Rights, by Robert B. Muir, San Francisco, for permission to divert 175 sec.-ft. of water from Bucks Creek and Grizzly Creek tributary to the North Fork of the Feather River in Plumas County. The water is to be used for the generation of electric energy.

Westinghouse Company Organizes Acceptance Corporation

As an expansion of its service to electrical dealers and appliance manufacturers, the Westinghouse Electric & Manufacturing Company has announced the formation of the Westinghouse Acceptance Corporation, a $2,000,000 enterprise to assist buyers of Westinghouse products in the financing of time-payment sales of their apparatus. G. Brewer Griffin, recently manager of the Westinghouse automotive equipment department, will have active charge of the new company, as vice-president and general manager.

According to Mr. Griffin, the acceptance corporation in the main was formed to furnish a more complete low-cost, simplified service to those providing the sales outlets of Westinghouse apparatus. The purpose is to furnish financial service to dealers and manufacturers which will assure more rapid and profitable turnover of their capital involved in time-payment transactions and at the same time provide a cooperative service to expand the volume of the time-payment business of the dealers.

The head offices of the new corporation will be in the East End Trust Building, Pittsburgh.

California Displaced by New York in Electricity Generation

In the United States during 1924 more than 59,000,000,000 kw-hr. of electricity were generated by water power and fuel, according to recent reports from Washington. Statistics compiled show that New York led in the production of electricity by water power, having generated 19.84 per cent of the total, and California was second with 15.76 per cent. For the three years previous California had been first. Washington produced 7.08 per cent; Montana 5.69 per cent; South Carolina 4.35 per cent; Idaho 3.96 per cent; Michigan 3.78 per cent, and Iowa 3.48 per cent.

New York also led in the production of electricity by means of fuel, with 13.64 per cent of the total. Pennsylvania generated 12.88 per cent; Illinois 11.45 per cent; Ohio 9.39 per cent; California 6.20 per cent; Michigan 4.97 per cent; West Virginia 4.45 per cent; and Massachusetts 4.28 per cent.

Southern Delegates Attend Meeting.—The southern division was well represented at the quarterly meeting of the California Electragists recently held in Visalia, Calif. Among those present were: C. W. Jones, T. L. Hall and A. Hall, Pomona; S. F. Jones, Covina; Mr. and Mrs. J. F. Zweiner, San Diego; Frank McGinley, Wilmington; P. H. Needham, A. Hill, J. A. Lenzinger, and H. B. Woolsey, Beverly Hills; F. E. Elser and A. L. Spring, Los Angeles; J. J. Farley, Fullerton, and C. J. Geisbush, executive secretary.

Transformer Standards Booklet Revised.—Completely revised and brought up to date is the fourth edition of the "Transformer Standards of the Electric Power Club" which recently came from the press. This issue contains all of the new standards which have been adopted since the 1924 edition was circulated. Diagrams and tables support the text in setting forth usable information in an intelligible manner.

Annual Reports of Six Electric Utilities Are Presented to Stockholders

The annual reports of six utility companies engaged in the generation and distribution of electrical energy in the West have been published recently. Five of these reports deal exclusively with companies operating in the West, and the sixth is that of an operating company with large interests in the eleven Western states. The reports have been reviewed for the benefit of Journal of Electricity readers.

Southern California Edison Company

The annual report to the stockholders for the year 1924 has been published recently by the Southern California Edison Company, Los Angeles. It gives a comprehensive statement of the status of the company, and the facts are presented simply and clearly.

The gross earnings for the year 1924, according to the statement, amounted to $21,389,499.66 as compared with $20,211,160.20 for 1923. The net earnings, however, were $8,395,720.10 as compared with $11,324,688.98. The decline is accounted for by the great increase in operating costs due to the water shortage, the winter of 1923-24 holding the record for the lowest precipitation in California in forty years. This water shortage caused a curtailment of hydroelectric output and a coincident increase in demand from irrigation centers. The company was forced to put into service a number of small generating plants that had been abandoned and shut down for years and in addition had to purchase power extensively from other companies. This resulted in $11,314,296.58 being expended for operating expenses and maintenance as against $6,984,904.10 in 1923. At the same time the company distributed and sold 1,353,933,547 kw-hr., which amounted to 173.791,355 kw-hr., or 15 per cent more than in 1923, which had been the company's record year. The report states that while these excessive costs make an abnormal showing in operation for the year 1924 they will be absorbed over an average number of years, partially out of the contingency reserve for 1924 and the remainder from the reserve accumulation in subsequent years.

During the year $14,000,000 in bonds was marketed and the proceeds used to reimburse the treasury for capital expenditures. A total of $1,186,600 in bonds was retired during 1924. The number of stockholders increased by 4,467 for the year, making a total of 70,103. Since the inception of the customer-ownership plan of 1917, when the company had approximately 2,000 stockholders, 68,000 have been added. During that period $61,086,700 par value shares were sold, of which $7,755,400 par value shares were subscribed by employees. Stock sales amounted to $14,472,500, covering 29,360 shares of 7 per cent and 100,000 shares of 6 per cent preferred and 5.365 shares of common. For the year 1925 $10 000,000 7 per cent preferred stock is to be sold.

The principal items of capital expenditures in 1924 were:

Big Creek water power plants under construction	$ 8,926,264.43
Additions to Long Beach steam plant	8,769,794.48
Additions to 220,000-volt transmission system	1.637.75".80
Miscellaneous additions to generating plants	520,367.77
Transmission and telephone lines	834.559.82
Substations	2,422,273.88
Electric distribution system	4,139,155.58
General store, shop and test department, buildings and equipment	1,145,259.99
District offices, stores, garages and miscellaneous	1,005,992.99
Total	$29,401,421.74

The budget for new construction expenditures for the year 1925 is summarized as follows:

Water power development	$ 7,535,000
Steam power development, Long Beach steam plant	3,965,000
Miscellaneous additions to water power and steam plants	595,478
220,000-volt transmission lines, substations and right-of-way	1,500,000
Transmission lines and substations (60.000 volts and under)	1,077,000
Distribution lines and substations	8,750,000
Miscellaneous buildings, equipment, system betterments, subsidiary companies, etc.	1,577,522
Total	$25,000,000

The total output of the Edison system in 1924, including water power plants, steam plants and purchased power, was 1,687,888.206 kw-hr., as compared to 1,548,896,120 kw-hr. in 1923. The connected load in 1924 amounted to 1,003,485 hp. as against 899.950 hp. in 1923.

Due to the water shortage and consequent curtailment of hydroelectric output, the company deferred its new business activity during the greater part of 1924, but the report states that "the outlook for 1925 from the company's standpoint is unusually bright in the direction of adding new business and all reasonable demands for service will be promptly met."

Pacific Gas and Electric Company

An increase of 13 per cent in gross operating revenue for the year 1924 is reported to the stockholders of the Pacific Gas and Electric Company, through its president, W. E. Creed, in the nineteenth annual report recently issued, the total being $44.451.586 os compared with $30,321,535 for 1923. The principal factors contributing to this increase of $5,130,051 were: normal growth of a permanent character. measurable by the net addition of 51.816 customers, exclusive of those taken over in the acquisition of other properties: increase of 134,791,000 kw-hr., or 11.2 per cent in electric sales, and increase of 1.602,683,200 cu.ft., or 11.7 per cent in gas sales; the inclusion of earnings of acquired companies aggregating approximately $170,000 more than the corresponding figure of 1923; two increases in gas rates; increased use of electric energy for irrigation induced by the drought experienced in California in 1924; addition of about $140 000 to gross revenues due to one additional day's operations, 1924 being a leap year.

General and administrative expenses for the year were substantially the same as in 1923, but operating expenses increased by $5,222 810. The increase is attributed to the following causes: extraordinary expenses, temporary in character, of approximately $2 500.000 incurred chiefly in the operation of steam plants to supply the deficiency in output of hydroelectric plants due to drought conditions; increased cost of oil to the extent of $1,930,000; added expenses of $793,000 normally following the much larger volume of production and distribution in 1924 and of service to 53,582 additional customers. The ratio to gross earnings of all ordinary operating expenses, including maintenance, taxes, etc., but excluding temporary expenses occasioned by the drought, was 57.8 per cent in 1924 as against 60 per cent in 1923.

During the drought increased demands, particularly from agricultural sections, aggregated 134,791,000 kw-hr., or 11.2 per cent of the preceding year's electric sales. The report states that by extraordinary efforts the company was able to go through the critical period without curtailing deliveries of electric energy to any of its customers, without lowering service standards, without refusing any new business offered, and, by strictest economy and the deferment of expenditures not essential to the service or immediately necessary, without impairment of its financial position, notwithstanding the fact that no increase in rates was requested. Total net income from all sources amounted to $16,732,323, or $253,991 in excess of 1923, a relatively small increase in view of the greatly increased volume of new business and of the large amount of new capital invested during the year. The report points out that the correct view to take in this instance is that, now that the conditions which compelled a temporary increase of $2,500,000 in operating expenses have disappeared, the benefits to which the company is entitled from the additional business and capital investment merely were deferred, through unavoidable circumstances, and should be realized under present normal conditions.

The dividends on preferred stock amounted to $3,244,603 and on common stock $3,040,123. The report invites attention to the fact that the broadening market for its common and preferred stocks is reflected in constantly decreasing average holdings. In the ten and one-half years since the company initiated the customer-ownership policy the average number of shares owned by each preferred stockholder has decreased from 79.5 to 25.9 and that owned by each common stockholder from 162.3 to 39.6 The average amount of both classes of stock held by each of the 31,859 customer-owners as of Dec. 31, 1924, was 30.5 shares as compared with 130.9 shares on June 3, 1914. At the close of 1924, 15,621, or 53.3 per cent of the company's stockholders owned 10 shares or less and 95.7 per cent owned not to exceed 100 shares each. This is exclusive of stock being purchased on the installment plan by 2,549 employees.

The report states that the company ranks second in the United States in its hydroelectric output and fourth in the output of power generated in both hydroelectric and steam electric stations. It now operates twenty-seven hydroelectric plants with a combined capacity of 426.239 hp., and four steam electric generating plants with an installed capacity of 190,349 hp., the aggregate installed capacity of all plants being 616,588 hp.

The company developed during 1924 a service sales program formed on the basis of a definite continuous effort on the part of the entire organization to merit, win and hold the good will of the public. It consists of: appeal to

employees; appeal to consumers; cooperation with dealers and civic organizations; appeal to public; educational trips to company properties. The report touches upon the functions of the personnel department and the welfare work handled through the Pacific Service Employees Association, and closes with an expression of appreciation of the fine spirit of loyalty and cooperation which has characterized the company's organization throughout the year.

San Joaquin Light & Power Corporation

W. G. Kerckhoff, retiring president of the San Joaquin Light & Power Corporation, Fresno, Calif., in his report to the stockholders for the year 1924, at the outset directs attention to the fact that that year was without precedent in the history of electric utilities in California on account of the extreme drought in water supply available for hydroelectric plant operation. In spite of this condition, the company's customers were served throughout the year without any curtailment, due to the purchase of additional power from the Turlock Irrigation District and other sources and the practically continuous operation of the company's steam plants. The dry season resulted in a great increase in load largely from agricultural use, the pumping load increasing 51 per cent over that of the preceding year. The increased demand of agricultural consumers was met in full at an additional expense to the company of over a million dollars, but no increase in rates was charged.

The total output for the year 1924 was 573,821,266 kw-hr., an increase of 23½ per cent over 1923. Of this, 12 per cent or 70,718,008 kw-hr. was supplied to the southern part of California to help relieve the shortage there.

Gross operating revenues for the year amounted to $7,450,925, a gain of 8.01 per cent over $6,898,353 in 1923. Revenues from electric light and power increased 8.51 per cent during 1924, while the sale of energy of 464,294,799 kw-hr. supplied a demand 20 per cent greater than in 1923. Excluding the energy supplied to foreign companies, revenues from business on the company's own lines increased 10.73 per cent, while the sales of energy correspondingly gained 25 per cent as compared with 1923. As of Dec. 31, 1924, service was being supplied to 70,263 consumers of electricity, water and gas, of which 3,822 were added during the year. The number of consumers, current supplied and revenues have doubled within a period of less than five years.

The 1924 operating expenses totaled $4,320,945 as against $2,954,544, an increase of $1,366,401. This increase is accounted for largely in the extraordinary expense for fuel used in the operation of steam power plants and purchased power directly attributable to the drought. Heavy maintenance expenditures were necessary during the year to reconstruct older transmission and distribution lines. Aside from these items, the increased expense incurred in normal operation is proportionately less than would be expected from the increased volume of business served, according to the report. In spite of the heavy expenses, all bond interest charges and dividends were met in full, the surplus accumulated in past years being drawn upon for a part of the dividends. Stock and bonds sold early in 1924 produced funds sufficient to carry construction well along into 1925. Only necessary additional facilities to connect new business and maintain service were constructed during 1924, the capital expenditures for that period amounting to $2,349,538.67 as compared with $4,581,006.55 for 1923. The construction budget for 1925 calls for an expenditure of $3,000,000.

New stockholders to the number of 1,062 were added in 1924, and at the end of the year 11,502 preferred stockholders were customer-owners. More than 60 per cent of the company's stockholders are residents within the territory served and more than 95 per cent within California. Of the stockholders, 58 per cent own less than five shares and 60 per cent are in the wage-earning class.

The company's new ten-story office building in Fresno was completed and occupied in February, 1924.

The report announces the acquirement by the Western Power Corporation of New York of the control of the San Joaquin Light & Power Corporation and its subsidiaries, the Midland Counties Public Service Corporation, and the Fresno City Water Corporation, and states the company will continue under the same management and policies "in rendering the best possible service to the public and in the development of the natural resources of the territory for the benefit of its customers."

The California-Oregon Power Company

The annual report of The California Oregon Power Company for the year 1924 begins with a record of growth by setting forth a comparative statement of the annual gross and net earnings and operating and maintenance expense of the company from 1912 through 1924. An interesting comparison is afforded by the figures for 1912 and 1924 as follows:

	Value Physical Properties	Gross Revenue
1912	$ 4,189,325	$ 307,040
1924	15,415,091	1,699,764

The company has nine generating stations with a total capacity of 38,780 kw. During the year a very active program of construction was carried on, the total for capital betterments aggregating $3,662,475.08. Of this $2,601,020.50 was expended for the three major undertakings of the program, namely, the construction of the new East Side plant on Link River in Klamath Falls, completed and placed in operation Aug. 22, 1924; the construction of Copco No. 2, a second power plant on the Klamath River just below Copco No. 1 plant, which will be completed during 1925; and the construction of a 110,000-volt transmission line 77½ mi. long, extending from the plants at Copco to Delta, Calif., that was finished in November, 1924. The balance, $1,061,454.58, was expended in rebuilding older lines, many extensions to new consumers, and considerable enlargments of various substations and other similar structures necessary to take care of growing demands for power and other electrical service in the territory. The completion of Copco No. 2 plant will add 30,000 kw. generating capacity, or a total capacity of nearly 69,000 kw.

During the year 1924 the company received authority to issue $2,500,000 in 6 per cent bonds, $1,500,000 in 7 per cent twenty-year sinking fund debentures, and $1,000,000 preferred capital stock. The total face value of $5,000,000 was and is being used to finance the construction program already referred to. The company has adopted the customer-ownership policy, and its stockholders now number over 2,300 persons. All of the 7 per cent preferred stock authorized previous to the issue just mentioned has been sold, and nearly one-half of the last issue has been sold to customers of the company. This distribution was made solely through the efforts of the members of the organization. Sales were made for cash or under a partial-payment plan of $5 per share per month, interest being allowed on all partial payments. Dividends have been paid regularly upon the preferred capital stock since its issuance.

From the standpoint of business development, the year 1924 has been one of the most successful that the company has had, increase in revenue from business within the territory amounting to 17 per cent. The aggregate increase in connected load, exclusive of wholesale deliveries, has amounted to 8,450 kw. Of this, 4,182 kw. represent added domestic and lighting load, the balance increase in power load. The total number of electric consumers has increased from 13,395 to 14,521. Over 316 domestic electric ranges were added to the lines during the year, bringing the total number up to 1,672. Cooking schools, cooking demonstrations and the publication of two range manuals helped stimulate range sales. Effort has been made to stimulate the use of electric power for pumping. Considerable time has been spent for that purpose, and a manual descriptive of pumping equipment and giving the cost of operation under various conditions has been published. The report states that the outlook for business growth for the year 1925 is encouraging.

Operating Maintenance Expense Taxes	Net Earnings	Kw-hr. Generated
$ 137,663	$ 169,376	21,492,374
698,888	1,000,875	175,778,058

Much stress is laid upon the personnel of the company's organization, and the statement is made that "the management is convinced that one of the important assets of the company is the splendid morale of the organization and the loyal support rendered by members of the organization." As a part of the personnel record, pictures are being taken of everyone in the organization. Pictures of some of the men at Copco, typical of the organization, are included in the report, and the regret is expressed that there is not space for all. The report is made particularly interesting by the number of fine photographs of the company's different projects.

Los Angeles Gas & Electric Corporation

The annual report and year book for 1924 recently issued to the stockholders of the Los Angeles Gas & Electric Corporation states that the corporation has experienced a healthy growth for the year, that everything points to a continuance of that growth, and that the outlook is most promising.

Gross receipts for the year are given as $16,056,722, total operating expenses

and taxes $9,446,604, and net operating income $6,610,117. Dividends paid on both preferred and common stock amounted to $1,417,863. Net expenditures for additions and betterments to plants and equipment during 1924 were as follows:

Gas works	$ 1,760,390.46
Electric generating stations	2,523,278.79
Gas distributing system	3,774,547.29
Electric distributing system	3,333,076.93
General betterments	2,590,289.65
Land purchased	1,712,219.93
Total	$15,693,803.05

Improvements planned for the coming year call for an expenditure of approximately $13,000,000.

An increase in the preferred stock of the company from $10,000,000 to $30,000,000 and in the common stock from $20,000,000 to $30,000,000 was authorized in 1924.

The Los Angeles Gas & Electric Corporation is a staunch advocate of customer-ownership, and on the first of the year (1925) there were 142.857 shares of preferred stock outstanding or being sold on installments. In addition to the sale of stock, bonds amounting to $8,000,000 were sold in February and to $6,000,000 in November.

The output of electricity in 1924 was 158,805,776 kw-hr., exclusive of electric current supplied to relieve the shortage on other systems. The figure given is an increase of 24.96 per cent over the 1923 output, which amounted to 127,357,201 kw-hr. The number of electric meters as of Jan. 1, 1925, was 111,075. The report states that the growth of the corporation's service is well illustrated by the fact that the number of gas meters and gas output practically doubled in the last four years, while the number of electric meters and the electric output doubled in the last three years; the gross earnings also doubled in the last four years.

The report pays particular attention to employees activities, which include the employees' insurance fund, Old Guard and band, and baseball, basket ball and bowling teams.

Standard Gas & Electric Company

The Standard Gas & Electric Company, operating company for the Byllesby properties, in the twelve months ended Dec. 31, 1924, had the most successful year in its history, according to the statement of its president, John J. O'Brien, in the annual report to the stockholders recently issued. For that period gross earnings amounted to $6,098,532, an increase of 17.35 per cent over the preceding year. The balance available for common stock dividends was equal to $6.61 a share on the 302,693 shares outstanding Dec. 31, 1924, there having been an increase of 90,693 shares during the year due to the conversion of debenture bonds. Total holders of all classes of the company's stock were approximately 20,600 at the close of 1924, an increase of 7,900 during the year.

The operated utility companies, as a whole, enjoyed good growth in business and earnings. Combined gross earnings of these companies increased 9.07 per cent, and net earnings increased 13.6 per cent. The total number of customers increased from 691,041 to 740,964, and total electric connected load increased from 1,101,998 to 1,241,787 kw. Electric energy output for the year amounted to 1,469,377,905 kw-hr. The company has increased substantially its holdings in Northern States Power Company and now owns the controlling interest in that company.

Operated utility companies continued the successful development of the customer-ownership policy inaugurated in 1915, and at the end of the year had approximately 64,000 shareholders, a net gain of about 14,000.

The total amount expended in 1924 for construction of new plants, additions, improvements, transmission and distributing equipment was $30,939,715 and $31,388,262 in 1923. The construction budget for 1925 has been set at $22,948,000, which will be devoted largely to transmission and distributing equipment needed to reach and serve additional customers. New electric generating capacity completed and put into service in 1924 amounted to 179,925 hp., of which 31,225 hp. was hydroelectric and 148,700 was steam. The most important water-power development finished was the 27,000-hp. unit of the El Dorado project of the Western States Gas & Electric Company, Stockton, which went into service late in January, 1924.

The report states that the Byllesby Engineering & Management Corporation had a very satisfactory year and its earnings were correspondingly good, and concludes with the statement that the outlook for the continued growth and prosperity of the Standard company is most encouraging.

Report to Stockholders Issued by General Electric Company

The thirty-third annual report of the General Electric Company, Schenectady, N. Y., to its stockholders recently was issued for the year 1924. The report shows that orders received in 1924 amounted to $283,107,697, a decrease of 7 per cent from those received in 1923, which amounted to $304,199,746. Unfilled orders at the end of 1924 aggregated $68,958,000 as against $87,112,000 at the end of 1923. Net sales billed in 1924 totaled $299,251,869 and in 1923 $271,309,695. Cost of sales billed, including operating, maintenance and depreciation charges, reserves and provision for all taxes, amounted to $264,909,538 as against $241,653,949 in 1923, leaving a net income from sales in 1924 of $34,342,331 as compared to $29,655,747 the previous year. Deductions for interest, discount and additions to general reserve left available for dividends $39,235,548 in 1924; in 1923 the figure was $33,525,118. Dividends of 6 per cent on special stock, amounting to $1,195,405, and 8 per cent on common stock, amounting to $14,404,980, were declared in 1924. The net book value of the manufacturing plants of the company is given as of Dec. 31, 1924, as $55,769,645. The number of stockholders of both classes as of Dec. 3, 1924, was 37,716, of whom 45 per cent were women.

The report explains the disposal of all of the General Electric Company's holdings of the capital stock of the Electric Bond & Share Company by means of the organization of a new corporation. (Journal of Electricity, Jan. 15, 1925, p. 72.)

The International General Electric Company, Inc., New York, which conducts the export business of the General Electric Company, has issued its sixth annual report to the stockholders covering the year 1924. During this period a reduced volume of business was secured, owing to the continuation of unfavorable conditions in foreign countries prevalent since late in 1920.

Orders booked during 1924 amounted to $17,590,000 as compared with $21,743,000 in 1923, the decrease due in part to the elimination of orders from Canada, business with that country having been carried on since early in 1924 by the General Electric Company, which acquired a majority of the common stock of the Canadian General Electric Company, Ltd. Sales billed during the year aggregated $22,590,108 as compared with $22,371,526 in 1923, this result being due to the completion of orders carried over from the previous year. The 1924 total net income amounted to $2,512,816 as against $2,526,251 for 1923.

The statement reports strong competition from British and continental manufacturers, resulting in a reduction of profit from selling operations from $967,506 for 1923 to $690,371 for 1924. It is anticipated that keen competition will continue, but general business conditions abroad are improving, and "it is felt that orders booked in 1925 will be substantially in excess of those of 1924."

Extensions Are Made to Pueblo Street-Lighting System

Extension of the street-lighting system in Pueblo, Colo., has been carried to such an extent that at the present time there are ornamental street lights on over thirty-seven miles of city streets. During the past five years nearly one thousand ornamental standards have been erected for street lighting purposes. Service is furnished by the Southern Colorado Power Company.

In the commercial district of the city five-light Corinthian columns are used. Four standards are placed 90 ft. apart on each side of the street in the downtown blocks. In the residential part of the city two types of posts are used. On streets with center parkways five-light posts of the Union Metal Company's make are installed in the center of the street intersections on concrete bases. Single-light standards using Nova-Lux heads with prismatic glassware are installed on the other residential streets.

Five-light posts with concrete bases are installed on Pueblo streets having center parking.

Washington Water Power Company Cuts in 110-kv. Line

The new Long Lake-Stratford 110-kv. transmission line of The Washington Water Power Company recently was cut into service. Work on this line has been under way since early last fall. Previous to cutting the line into service it was given a series of preliminary tests. The results of these tests were satisfactory in every way, according to B. M. Merrill, superintendent of light and power.

This 90-mile section is part of the line which connects the Long Lake hydroelectric plant with Taunton on the Milwaukee railroad. The 20-mile stretch of older line from Stratford to Neppel has been newly rebuilt to operate at 110 kv. Another section, 25 miles in length, completes the transmission system from the power plant to the point of delivery to the railroad system.

This new line is intended to provide duplicate service to the railroad as well as to furnish additional power to the Palouse and Big Bend districts. At Lind, on the Milwaukee road, a bank of 6,000-kw. transformers has been replaced with a 10,000-kw. bank to meet the increasing demand for the abovementioned districts.

In the city of Spokane considerable work is being done to enlarge the capacity of the distribution system. Two 13,000-volt tie-lines have been completed between the new East Side substation and the Post Street substation. One of the two 60,000-volt transmission lines connecting the Post Falls generating plant with the Twenty-ninth Avenue substation has been looped through the new East Side substation. This will serve to make the transmission network more complete.

Work on the East Side substation has been under way for several months and is progressing favorably.

Kitchen Lighting Campaign Being Conducted in San Diego

As the result of six weeks intensive sales work 3,500 homes in San Diego County, Calif., have contracted for the installation of daylight kitchen lighting units. The present campaign, being conducted by the San Diego Consolidated Gas & Electric Company, at its inception was scheduled to continue for eight weeks.

During the first six weeks of the drive 20,000 calls were made by the salesmen of the company. According to G. H. P. Dellmann, lighting sales engineer of the company, under whose supervision the campaign is being conducted, over 15 per cent of the wired homes in San Diego will be equipped with the unit when the campaign is closed.

Work of many months in the preparation of the campaign is bringing the results that were hoped for, according to Mr. Dellmann. In anticipation of the campaign, billboard advertising was started early last year. To prepare the field for the broadsides which followed, the billboards drew attention to the lighting of the average kitchen.

A carefully worked out broadside was prepared, and as the sales force was about to start out upon its campaign in a district the broadside has been sent out so as to reach each home three to five days ahead of the salesmen.

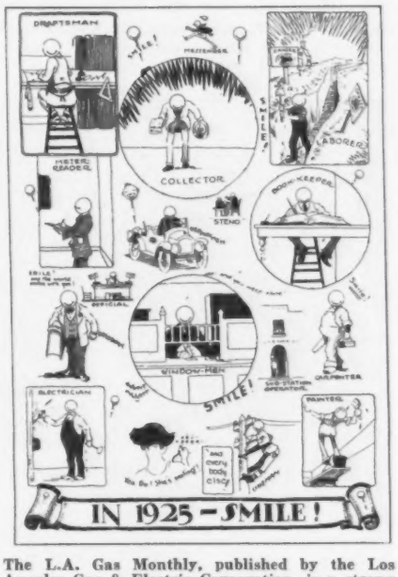
Selection and training of the sales force were given particular care by Mr. Dellmann. Classes for the salesmen were held at night, and each salesman was required to report in person each day to the central office. Good results have been obtained by the San Diego company from the "double cards," better than two per cent of the cards bringing in requests for the units after a salesman has left them.

Employees Home Lighting Contest Held by Pacific Company

Supplementing the Employees Home Lighting Contest sponsored by the N.E.L.A., the Pacific Power & Light Company, Portland, just completed such a contest for its employees, exclusive of officials, department heads and district managers. The rules of the contest, as well as the routine required of contestants, were substantially the same as those of the international contest for school children.

From the excluded employees were chosen seven judges, who picked the following winners from seventy entries: First prize, $100, W. L. Parkhurst, chief clerk, The Dalles, Ore.; second prize, $50, R. W. Hopper, extension clerk, Walla Walla, Wash.; third prize, $25, Marian Clark, purchasing department, Portland. The winning essay and primer will be submitted as a contestant in the employees' national contest.

"Engineering Data from Aerial Views."—This is the title of a booklet recently issued by Brock & Weymouth, Inc., Engineers, 1607-1609 Walnut St., Philadelphia. It outlines briefly the firm's specialty, the making of accurate topographic maps from aerial photographs, to be used as the bases for scientific study of engineering projects and is well illustrated with views of the camera, planes and other equipment used, as well as of aerial photographs, contoured plates, and an aero-topographic map made by the Brock process. F. E. Weymouth, president of the company, was for a number of years chief engineer of the U. S. Reclamation Service.



The L.A. Gas Monthly, published by the Los Angeles Gas & Electric Corporation, is a strong believer in the fact "that Faith Moves Mountains—Smiles Move Men," and advertises the fact with a full-page cartoon, which is here reproduced.

Changes in Tacoma Distribution System Contemplated

An ordinance calling for the expenditure of $95,000 for making changes and additions to the distributing system of the city light plant in Tacoma, Wash., designed to fit in with the Cushman power development, has been introduced in the city council. Besides making extensive changes in the distribution system, the ordinance also calls for the purchase of a synchronous condenser to be installed at the Nisqually substation at South Twenty-fifth and C Streets.

In altering the city distribution system of the light department, account is being taken of the fact that power from the Cushman plant will come in at 110,000 volts, whereas the La Grande plant is sending in power now at 60,000 volts. The first stepdown in the future system will be to 50,000 volts, and lines will carry current to district automatic substations at this voltage. The district substations, of which three will be built this year, will step the current down to 13,000 volts. The entire cost of the new distribution features will be actually about $150,000.

Gem Irrigation District Plant Under Construction

Work on the 10,000-kva. power plant, being constructed for the Gem Irrigation District by the U. S. Reclamation Service at the Black Canyon Dam on the Payette River near Emmett, Ida., is progressing. Orders have been placed for two 6,000-hp. S. Morgan Smith vertical turbines direct connected to two 5,000-kva., Allis-Chalmers generators with direct connected exciters. The power house foundation and draft tube outlets have been completed.

Power from this plant will be transmitted at 66,000 volts over the lines of the Idaho Power Company to the Gem Irrigation District, which has contracted to pay the U. S. Reclamation Service the cost of operating the plant plus five per cent interest on the cost of the power plant only, plus an amount for depreciation to be estimated by the Reclamation Service. It is expected that the plant will be completed in time for the 1926 irrigation season.

Corona Discharge Mechanism and Characteristics Discussed

The mechanism and characteristics of the corona discharge as revealed through several methods of study are discussed ably in Bulletin No. 19 of the Engineering Experiment Station at Purdue University. To some extent the various investigations have been treated as separate units, but the results are interrelated, and each carries its share toward the drawing of the final conclusions.

Some of the work described in this bulletin previously has been published in the form of papers before the American Institute of Electrical Engineers and the Academy of Science. Part of the work mentioned is incomplete. However, it has become so closely related to the study of nitrogen fixation that it is to be continued under that head.

The text is well handled and organized in a very readable and understandable manner. The publication comprises 112 pages, 98 illustrations of apparatus and spectra and 7 tables.

To Hold Hearing on Washington Company's Rates June 15

Hearing in the complaint initiated by the city of Walla, Walla, Wash., against the Pacific Power & Light Company of Portland, involving the rates, valuations, rules and regulations of the company's operations throughout the southern portion of the state of Washington, has been set for June 15 at Walla Walla. The inquiry covers all the company's operations throughout the Yakima and Walla Walla Valley, including the cities, towns and rural districts.

Original complaint was field by the city of Walla Walla last May. The state followed with formal complaint in July, and the city filed an amended complaint in December. The city claimed exorbitant rates were based on excessive valuations, and contended that there were a number of generating stations no longer used or needed, which should be stricken from the valuations entirely. The hearing will be before all three heads of the Department of Public Works.

California Electrical Bureau Advisory Board Meets

Topics relating to the management of the California Electrical Bureau were discussed at a meeting of the advisory board of the organization, held at the Palace Hotel, San Francisco, April 24. R. E. Fisher, chairman of the committee, presided.

The board decided to apply for membership in the California State Association of Electrical Inspectors. The secretary reported that negotiations for four additional electrical homes had been completed since the last meeting, the total for the year now being one home already completed and under inspection and eleven more under way. It was reported that negotiations were under way with the N.E.L.A. to receive permission to make an exhibit at the forthcoming national convention in San Francisco, June 15-19.

C. T. Hutchinson, chairman of the finance committee, reported that subscriptions to the campaign fund for 1925 were within about 3 per cent of the amount subscribed in 1924 and that in all probability the 1924 subscriptions would be equaled in 1925. The finance committee was instructed to develop additional prospects for financial support to the Bureau, as it was pointed out that too small a proportion of the industry was supporting the movement.

A committee headed by W. S. Berry reported the results of its labors in preparing specifications for the proposed Red Seal plan. After an extended discussion the plan submitted by Mr. Berry, with minor alterations, was adopted for submission to the Society for Electrical Development for its approval before being formally put into effect.

At the afternoon session Clark Baker presented an interesting series of charts visualizing the possibilities of the Bureau for extending its work and usefulness. In view of the larger responsibilities that had been placed upon the finance committee, L. E. Clark, Ross Hartley and the assistant secretary from southern California and C. D. Slaughter and Clark Baker from northern California, were added to the committee in order to assist in raising the additional funds required for the extension of the Bureau's activities.

A report was rendered by the Bureau secretary on the activities of June Bride Week; a sample of a three-colored poster was adopted as submitted. Every branch of the industry had been advised of the June Bride campaign and their assistance solicited in making a thorough success of this effort.

Mr. Berry presented a report covering an analytical study that he had made in order to ascertain a rational basis for the apportionment of the operating expenses of the Bureau among the different branches of the industry. His conclusions were that central stations should contribute not less than 70 per cent of the funds necessary, the balance to be provided by the jobbers, manufacturers and other branches of the industry. The matter was referred to the finance committee for consideration.

Among those present at the meeting were R. E. Fisher, W. S. Berry, C. L. Chamblin, H. H. Courtright, F. E. Elser, W. L. Frost, Charles Listenwalter, F. H. Woodward, W. F. Price, Clark Baker, Victor Lemoge, C. C. Hillis, Garnett Young, C. T. Hutchinson, C. E. Wiggin, C. E. Heise and P. H. Booth.

Second Arizona Meter School Is Gratifying Success

A special class in metering was held at the University of Arizona, Tucson, Ariz., April 2-4, under the direction of Prof. Paul Cloke. The session was opened with an address of welcome by Dr. Butler, dean of the Engineering Schools, who set forth the interest of the university in promoting the development of metering to a high standard.

Most of the Arizona power companies' representatives who were in attendance are shown in the accompanying photograph. These men were much impressed by the benefits derived from such a gathering and were loud in their praise of both the Pacific Coast Electrical Association and the university for their efforts in promoting the meetings.

The growth of the meter school from four members outside of Tucson in 1924 to twenty-five in 1925 is a good indication of the support and faith which the widely separated power companies of Arizona have in cooperation and standardization of metering methods.

Disk-Type Thermostat Used in Westinghouse Curling Iron

The principle of the disk-type thermostat has been applied with much success in the Westinghouse automatic curling iron, according to the Westinghouse Electric & Manufacturing Company. The iron may be used on either a.c. or d.c. circuits, and the thermostat as installed in it maintains it at constant temperature.

The construction of the disk-type thermostat is decidedly simple. There are three contact buttons, mounted on the bi-metal disk. Each of these buttons is of sufficient size to give two separate breaks. They are rolled silver plated, similar to the contacts which are mounted on a base. With these six breaks, and depending on the size of the thermostat, it is not a difficult matter to break 1,000 watts d.c. with the smaller size thermostat and as high as 3,500 watts d.c. with the larger size. This, of course, is done without the use of an external relay, and the thermostat is put in direct series with the load, doing away with the necessity of an auxiliary circuit. It is estimated that the time of the actual operation of the thermostat is approximately .00016 seconds. The speed at which the contacts move approximates that of a bullet traveling from the muzzle of a high-powered rifle. With such a speed, there can be no doubt about the positive action of the contact.

Slow-moving thermostats have been in use for years, and there are many patents in existence covering them and their various modifications. It was not until 1923, however, that a basic patent was issued covering a quick-make and quick-break thermostat in which the bi-metal itself was the quick-moving part without the use of levers, springs, and similar devices. This patent covers, among other controls, a disk-type thermostat which does away with the necessity of complications so common to ordinary thermostats and permits the thermostat itself to break, without the use of a relay, currents as high as 3,500 watts, either a.c. or d.c. John A. Spencer, of the Spencer Thermostat Company, Cambridge, Mass., was the first to work along lines of thought which ultimately led to the disk-type thermostat.

Part of the group of Southwestern electrical men who attended the meter school recently held at the University of Arizona, Tucson

News of the Electragists

California Electragists Have Successful Quarterly Meeting at Visalia

Seventy-five members of the California Electragists gathered at the Hotel Johnson, Visalia, May 9, on the occasion of the quarterly meeting of the association. The executive committee met at 10:30 a.m., and the general open meeting was held at 1:30 in the afternoon.

The meeting was presided over by Victor Lemoge of San Francisco, president of the association. One hundred signed applications from members of the southern division were presented and accepted.

Clyde Chamblin, of the California Electrical Construction Company of San Francisco, gave a report of the meetings of the executive committee of the Association of Electragists, International, and of the board of directors of The Society for Electrical Development, that he recently attended in New York City. He told of a meeting with the electrical contractors of Detroit, Mich., which had been arranged by Ernest McCleary, executive committeeman from the Great Lakes district. In discussing the meeting of the executive committee of the A. E. I., Mr. Chamblin spoke of the election of James A. Fowler to succeed James R. Strong as president of the association and of some of the characteristics of the two men. He stated that the association modified its stand on the all-metal standard and would devote its efforts to its adoption in congested sections and certain types of buildings. Mr. Chamblin mentioned the employees' insurance plan of the association. He also discussed the work of the code and cost data committees and some of the other activities of the international association.

In speaking of the meeting of the board of directors of The Society for Electrical Development, Mr. Chamblin pointed out the fact that that organization was the clearing house for all branches of the industry. He stated its place in national activities corresponded to that of the California Electrical Bureau in California.

Victor W. Hartley, executive secretary of the California Electrical Bureau, discussed some of the plans of the bureau for this year's "electrical wedding-gift drive." He suggested that details of the plan be secured from pages 332 and 333 of the May 1 issue of the Journal of Electricity. In addition to the information contained in the Journal he stated that moving picture slides could be obtained for use during the campaign.

Walter F. Price, executive secretary of the northern division of the California Electragists, told of the progress on the Red Seal House-Wiring Plan. He stated that it was an efforf to secure adequate wiring for all homes. The California Electrical Bureau will be the agency of The Society for Electrical Development in California in conducting the Red Seal Plan and will be under a license from that body. A set of specifications will establish a minimum standard which must be met before a house can be classed as a Red Seal home. A large supply of these specifications will be printed and distributed to the contractors. The present plan provides that a copy of these specifications be submitted with each proposal made by a contractor and that he urge the owner to have a Red Seal job installed. Mr. Price stated a number of power companies and manufacturers already have outlined their plans for cooperating with the movement, and a great deal of advertising will be done to bring the plan before the public.

Felix Butte, of the Butte Electric Equipment Company of San Francisco, told why he is a member of the California Electragists. He stated that the leaders and successful contractors are members of their trade associations. He pointed out the value of the information and knowledge obtained from the material received from the national association. The value of the contact with fellow members and others in the industry, especially at conventions and similar gatherings, was stressed particularly. Mr. Butte emphasized the value of collective action in local, state, and national activities. He read some statistics prepared by insurance companies that showed that out of 100 men at twenty-five years of age, only four were well to do and one was rich at the age of 65. He expressed the belief that to be successful at sixty-five years of age, it was necessary to band together, trust one another and hold association membership above everything else.

C. J. Geisbush, executive secretary of the southern division of the California Electragists, told the members of the activities in the southern division. He stated that the electragist movement had made the contractors realize the fact that they have a common problem which can be solved only by organization and meetings. He said that an analysis of the electrical contractors in the state had shown that 51 per cent of those who entered the business failed within the first year; and that only eight in 100 remained in the business ten years. He told of some of the steps leading up to the affiliation of the contractors of the southern division with those of the northern into a unified body of California Electragists. Mr. Geisbush stated that after an analysis of their problems they had decided to take up the subject of estimating as their first big problem to be considered. He described the method that is being used by them in making a detailed study of this problem and the method used in presenting this to the contractors.

Just previous to closing the afternoon session, the members stood in silent tribute to the memory of Jacob Senner, Electric Equipment Company, Lodi, Calif., who died May 6 as a result of injuries received in an accident.

Contractors were present from San Diego to San Francisco. Fourteen motored from southern California to attend this meeting. Nineteen from San Francisco made the trip in a special Pullman.

Pacific Coast Electrical Association

Plans for Conduct of N. E. L. A. Convention Are Nearing Completion

General plans, together with the reports of various committee chairmen, were discussed at a meeting of the N.E.L.A. general convention committee held in San Francisco on the evening of May 5. Under the direction of F. A. Leach, Jr., vice-chairman of the committee, plans for the reception of guests and general conduct of the convention were presented and approved.

E. O. Shreve, chairman of the budget committee, submitted a report to the effect that allocation of convention expenses to various branches of the industry had been arranged and that collections of funds were in process. C. E. Heise, chairman of the hotel committee, reported that registration was proceeding at a satisfactory rate and approximately 1,000 reservations, principally from points east of the Rocky Mountains, had been made.

D. E. Harris, reporting for T. E. Bibbins, chairman of the reception committee, stated that delegations representing the committee would meet all incoming trains at points some distance from San Francisco in order to extend proper courtesy to visiting delegates, and that flowers for the ladies and baskets of fruit would be distributed at hotel rooms. Members of this committee will be instructed to wear white hats with blue ribbons bearing the insignia of the N.E.L.A. in order that they may be distinguished easily. A joint meeting between Mr. Bibbins' committee, the transportation committee and the hotel committee is to be held in order that proper co-ordination in the inter-relationship of these committees may be effected.

R. E. Fisher, chairman of the entertainment committee, submitted a carefully arranged chart showing the nature of the entertainment that will be provided during the entire convention week.

For the Saturday and Sunday before the opening of the convention the golf committee has made arrangements to permit visiting delegates, arriving ahead of schedule, to play on these days. On Monday a luncheon is scheduled to be given by the San Francisco Electrical Development League. W. E. Creed will act as chairman of this luncheon, and a series of short talks from prominent visiting delegates is to be arranged. The president's reception, which will be held at the Fairmont Hotel Monday night, will take the usual form of affairs of this nature. Two orchestras will be provided, one for incidental music and the other for dancing at the pleasure of the guests. Tuesday evening informal dinner dances will be arranged at the various hotels; incidental entertainment will be furnished by professional entertainers who will rotate among the various hotels. Wednesday evening the public policy meeting will be held at the Auditorium. Thursday evening will be the "Gala Night," when special entertainment of an unusual nature will be provided by Joseph Thompson, who has charge of this evening's program. Friday afternoon by special arrangement with the Key System Transit Company a special excursion around San Francisco Bay will be provided by means of one of the Key System's electrically propelled ferry boats. For Saturday informal golf games and a special trip to the top of Mt. Tamapais have been arranged. For the ladies preparations for special entertainment are under way, including an automobile ride through Golden Gate Park, a visit to the Japanese Tea Garden and the Cliff House. On Thursday trips to outside points of interest, including Stanford University, the East Bay District and neighboring power plants, will be provided after the formal sessions of the convention are over.

F. S. Myrtle, reporting for the publicity committee, stated that plans for the functioning of his committee were well under day, arrangements having been made to digest the convention papers in order to furnish abstracts to the newspapers. Photographs and biographical data on prominent delegates will be supplied to San Francisco newspapers.

M. W. Scanlon, reporting for the advertising committee, submitted a photograph of the final design for the convention poster, which was approved. Orders have been placed for the posters and for stickers to be used on letters for advertising the convention. Negotiations are under way for flood-lighting the new building of the Pacific Gas and Electric Company, the Standard Oil Building, The Pacific Telephone & Telegraph Company Building, and possibly the Auditorium. Arrangements have been made for the display of flags on Market Street, these flags including the United States flag, Smiles Banner, and other banners carrying the insignia of the N.E.L.A.

J. B. Black, reporting for the information committee, stated that headquarters of this committee would be maintained at the Auditorium and that the regular operatives of the Foster Information Service would be used to furnish general information, supplemented by special information concerning all of the activities of the convention.

P. M. Downing, reporting for the properties committee, stated that arrangements had been made to provide suitable booths at the Exposition Auditorium for registration, ticket validation and Pullman reservation service, together with full telephone equipment.

Further discussion brought out the fact that, while there would be no exhibits of machinery or equipment, arrangements would be made to display a model street-lighting exhibit. The California Electrical Bureau will display a special window-lighting exhibit, and the University of California will present its portable home-lighting exhibit at suitable points in the Auditorium.

R. M. Alvord, reporting for the general transportation committee, stated that arrangements had been made by which a representative of the railroads would be in attendance at the Auditorium in order to permit validation of tickets at that point.

W. G. Vincent, reporting for the local transportation committee, stated that arrangements were under way to provide proper taxicab service at railroad terminals and also at the Auditorium.

J. F. Pollard, reporting for the registration committee, precipitated a general discussion as to the advisability of opening registration booths on the Sunday before the convention. It was decided that it would be advisable to permit registration at the Auditorium on Sunday, June 14, between the hours of 10 a.m. and 4 p.m.

COMING PACIFIC COAST ELECTRICAL ASSOCIATION MEETINGS

Electric Truck School—
Pacific Gas and Electric Company Building, San Francisco
June 8-13, 1925

Industrial Electric Heating School—
Pacific Gas and Electric Company Building, San Francisco
June 9-13, 1925

Pacific Coast Electrical Association—
Annual Meeting—San Francisco, Calif.
June 15, 1925

Hold Industrial Heating School in San Francisco June 9-13

Definite assignments of topics to be covered during the Industrial Electric Heating School to be conducted by the Pacific Coast Electrical Association in San Francisco June 9-13, have been made by the committee in charge. The school is to be conducted under the supervision of the Westinghouse Electric & Manufacturing Company, and all classes will be held in the new building of the Pacific Gas and Electric Company.

The subjects that have been given to the different instructors are as follows: "Fundamentals of Electric Industrial Heating" and "Methods of Securing Electric Industrial Heating Load for Central Stations," by T. A. Reid, Westinghouse Electric & Manufacturing Company; "Steel Melting," "Brass Melting" and "Heat Treating," by E. A. Wilcox, manufacturers' representative; "Industrial Electric Air Heating," by W. W. Hicks, manufacturer. Although "Welding" will be covered by some competent authority, no definite assignment has been made.

The school will be held during the morning hours of the week, and the afternoons will be left open for inspection trips to installations and manufacturers' displays of equipment. This arrangement will permit those who desire to attend the course on electric trucks that will be given by the electric truck school committee of the National Electric Light Association on the afternoons starting June 8 and concluding on June 13. Both schools will be held in the Pacific Gas and Electric Company's new building.

Enrollment in the course should be made through J. L. Farley, Pacific Gas and Electric Company, San Francisco.

Book Reviews

TELEPHONE CIRCUIT DIAGRAMS

By JOHN M. HEATH. 279 pages, 7 x 4½ in., $2.50. McGraw-Hill Book Company, Inc., New York.

In examining this volume one gains the impression that the subject matter must have been presented originally in a series of blackboard talks which have been reduced to writing and brought out in book form.

In the earlier portions of the book this leads to a rather long-drawn-out series of drawings and explanations which are somewhat out of proportion to the circuit variations shown but which no doubt were justified for the conditions under which they were presented originally.

However, the author defines his object as an attempt to present a set of circuit diagrams which will serve to illustrate the principles of a telephone system. Within this province he has developed a series of drawings and descriptions ranging from the most elementary magneto telephone to instrument and switchboard circuits typical of American common-battery telephone practice. The present edition contains several inaccuracies which no doubt will be corrected in a later edition.

The first 110 pages are devoted to local-battery magneto telephones, starting with the fundamental talking circuits and leading up to individual and party-line ringing systems and the associated switchboard cord circuits used for connections between lines. The balance of the book is devoted to manual common-battery systems, showing the fundamental circuit arrangements used by the Western Electric, Stromberg-Carlson, Kellogg, and Dean Telephone Manufacturing Companies, together with typical switchboard line, cord, and trunk circuits.

As the author himself states in the introduction, "up-to-the-minute telephone practice never can be obtained from books; books embody principles, while the latest practice always must be obtained from the engineers and manufacturers of the industry itself."

The prospective purchaser therefore should not expect that all his trouble-finding thereby will be made easy, but the beginner no doubt will find it of considerable value in studying the principles of manual telephony while the experienced man may find it useful as a reference.

The size, being the same as that of numerous handbooks and specifications in use in the telephone industry, is very convenient for carrying and should prove a distinct advantage.

—A. E. B.

Meetings

Tentative Program for N.E.L.A. Convention Announced

A tentative program covering the main events of the annual convention of the National Electric Light Association to be held in San Francisco June 15-19, has been prepared. The tentative program is as follows:

Sunday, June 14

Registration 10 a.m. to 4 p.m.

Monday, June 15

Registration, morning and afternoon.
Luncheon, San Francisco Electrical Development League.
Pacific Coast Electrical Association Convention, afternoon.
Executive Committee meetings of National Accounting, Commercial, Public Relations and Technical Sections, afternoon.
President's reception, evening.

Tuesday, June 16

Registration, morning and afternoon.
First general N.E.L.A. session, morning.
First sessions National Accounting, Commercial, Public Relations and Technical Sections, afternoon.

Wednesday, June 17

Registration, morning and afternoon.
Second general N.E.L.A. session, morning.
Second sessions National Accounting, Commercial, Public Relations and Technical Sections, afternoon.
Public Policy Committee meeting, evening.

Thursday, June 18

Registration, morning and afternoon.
Third general N.E.L.A. session, morning.
Third sessions National Commercial, Public Relations and Technical Sections, afternoon.
"Gala Night," entertainment, evening.

Friday, June 19

Registration in morning.
Fourth general N.E.L.A. session, morning.
Convention adjournment about 1.30 p.m.

All morning sessions will start at 9:30 and wil last until 12:30. Afternoon sessions will be opened at 2:30 and will close at 5:30. The meetings of the various sections will be held in rooms at the Exposition Auditorium, and the general sessions will be conducted in the Auditorium proper.

Peninsula Electrical Development League Organized

A gathering of men interested in the development of the electrical industry on the San Mateo peninsula resulted in the formation of the Peninsula Electrical Development League on April 23. After a dinner at the Portola Hotel, Burlingame, Calif., the meeting was called to order by F. J. Kiefer, of the California Electrical Bureau, who acted as temporary chairman. He explained that the purpose of the meeting was to discuss the feasibility of organizing a development league similar to others in successful operation in other sections of California.

He then introduced the following speakers. each of whom pointed out the many advantages of such an organization and enumerated the many benefits that he received from the league of which he was a member: C. B. Kenny, president, San Francisco Electrical Development League; C. E. Hershey, president, Santa Clara Development League; J. S. C. Ross, divisional sales manager, Pacific Gas and Electric Company; Victor Lemoge, president, California Electragists; L. F. Leurey, consulting electrical engineer, San Francisco; H. E. Sandoval, president, Sandoval Sales Corporation, San Francisco; Edward Martin, electrical contractor, San Francisco; and W. F. Price, secretary, California Electragists.

After a very interesting discussion and the usual parliamentary procedure, the Peninsula Electrical Development League was organized to cover the territory from the southern limits of San Francisco to the southern boundary of Mayfield, and the following officers were declared elected: president — C. E. Werry, Werry Electric Shop, Palo Alto; secretary-treasurer—F. A. Peck, Pacific Gas and Electric Company, Redwood City; directors—C. F. Schurk, Schurk Electric Shop, South San Francisco; Seth Cohn, Atlas Electric Company, San Mateo; L. H. Cook, Safety Electric Company, Menlo Park.

The board of directors was authorized to prepare a constitution and by-laws, which were adopted at the next meeting held April 30.

COMING EVENTS

Electrical Supply Jobbers' Association—
Annual Convention—Hot Springs, Va.
June 1-6, 1925

Associated Manufacturers of Electrical Supplies—
Annual Meeting—Hot Springs, Va.
June 8-13, 1925

Northwest Electric Light and Power Association—Annual Convention —
Gasco Building, Portland, Ore.
June 12, 1925

National Electric Light Association—
Annual Convention—San Francisco, Calif.
June 15-19, 1925

Golf Tournament Plans Made by Seattle Electric Club

On May 1 fifty members of the Electric Club of Seattle had announced intentions of participating in the annual golf tournament which was scheduled to start before the middle of the month. Chairmen of three committees in charge of the tournament include R. E. Thatcher, Puget Sound Power & Light Company; T. S. Wood, manufacturers' representative, and D. U. Chamberlain, Globe Electric Company.

The following prizes will be awarded: The president's cup, donated by H. J. Martin, president of the Electric Club of Seattle; club from Spalding's; club from Piper & Taft; club and a percolator from Westinghouse Electric & Manufacturing Company; waffle iron, Edison Electric Appliance Company; club, Whiton Hardware Company; waffle iron, Puget Sound Power & Light Company; driver, Riverton Golf Club; club by Western Electric Company; and a golf bag by the National Lamp Works.

Rural Electrification Is to Be Discussed at Meeting

Rural electrification, reclamation and farm structures will be the main subjects discussed at the meeting of the Pacific Coast Section of the American Society of Agricultural Engineers which is to be held at the Hotel Clark, Los Angeles, at 7 p.m. Friday, May 29.

Prof. B. D. Moses, executive secretary of the California Committee on the Relation of Electricity to Agriculture, will present a report of the work of this committee in California. This project is one in which the agricultural, central station and manufacturing interests in the state are working towards the goal of increasing the efficiency of electricity on the farm. Professor Moses will report particularly on the activities in connection with the investigations on dairy farms, electric brooding of chicks, performance of stationary spray plants, power requirements of the farm shop, and electric pumping.

David Weeks of the division of rural institutions, College of Agriculture, University of California, will discuss his recent economic investigations of state and government reclamation projects in California and Nevada.

Max Cook, farmstead engineer with the California Redwood Association, will present a paper entitled "Farm Structures; Maximum Results at Minimum Cost."

San Diego Electric Club Holds Two Interesting Meetings

Two interesting meetings recently were held by the Electric Club of San Diego. On April 28 the theme of the program was inter-industry cooperation, with R. T. Chace, San Diego, agent for the Westinghouse Electric & Manufacturing Company as chairman. K. E. Van Kuran, division manager for the Westinghouse company in Los Angeles, emphasized the importance of such cooperation toward the elimination of harmful competition. J. M. Morris, also of the Westinghouse organization, showed by means of diagrams the value of each part of the industry to the others, and D. C. Pence, of the Illinois Electric Company, outlined the possibilities of development in San Diego County based upon statistical records and natural tendencies of growth.

On May 5 the program took on a naval aspect, for Rear-Admiral A. H. Robertson, commander of the 11th Naval District in San Diego, was present and disclosed the fact that he had been professor of electricity at Annapolis for a number of years. Lieutenant-Commander Frank Luckel, who was active in the installation of radio stations for the Navy in Alaska, also spoke, dwelling on the importance of communication by cable and radio to the nation in peace as well as in war.

The Foundation Company Starts Work on Dam at Lake Almanor.—Raising of the Big Meadows dam of the Great Western Power Company, work on which was started recently (Journal of Electricity, April 15, 1925, p. 295), is being done by The Foundation Company. The immediate construction involves the raising of the dam 46 ft. and lengthening it to 1,250 ft. from the present 600 ft. The Foundation Company has commenced operations.

Personals

Sir Thomas Callender, managing director of Callender's Cable & Construction Company, Ltd., one of the best

SIR THOMAS CALLENDER

known English cable manufacturers, will visit the United States in the near future. Sir Thomas has been one of the pioneers and leaders in the British electrical industry, especially in connection with high-tension distribution. "Sir Tom," as he is known throughout the industry in Great Britain, entered his father's business, that of asphalt street paving in 1873. Through experiments made by himself and his brothers the insulating product known as vulcanized bitumen was discovered and patented in 1881. The following year a company was formed to develop this vulcanized bitumen as an insulator, particularly in the manufacture of insulated wires and cables. This company manufactured and laid down in London and the provinces a large number of the early underground mains. Due to the development of the electrical industry and the consequent increase in the demand for underground mains, the business grew to the point where it became necessary to reorganize the original company, and in 1898 Callender's Cable & Construction Company, Ltd., was formed. In addition to his duties as managing director of the Callender company, Sir Thomas is on the board of a number of its subsidiaries and is also a director of several of the great power companies of Great Britain.

F. G. Barnett, formerly superintendent of motor transportation for the Public Service Company of Colorado, Denver, has been made manager of the company's San Luis Valley district, succeeding A. F. Morairty. **E. J. Graham,** resident chief electrician at the new Valmont generating plant and a former officer of a motor transport company in the Army, has been named as Mr. Barnett's successor.

H. P. Coldwell, chief electrical engineer of the Victorian State Government Railways, Victoria, Australia, was an interesting visitor at a recent meeting of the San Francisco Electrical Development League.

R. T. Stephens, for the past two years division sales manager of the Sacramento division of the Pacific Gas and Electric Company, has been appointed manager of electric sales for that company in San Francisco. He succeeds H. E. Sandoval, who recently resigned to engage in business for himself. Mr. Stephens has been in the employ of the Pacific company since December, 1921, and has been engaged in sales work in nearly every division of the company, including San Francisco, San Jose, Shasta, Colgate, De Sabla, West Side and Sacramento. He has been an active worker in the Pacific Coast Electrical Association and other electrical organizations, and is well known by the members of the industry. He received his degree of bachelor of science in mechanical engineering from the University of Michigan.

A. R. Hathaway, for the past two years chief clerk at Bellingham, Wash., for the northern district of the Puget Sound Power & Light Company, Seattle, has been transferred to Pawtucket, R. I., where he will have a position in the office of the assistant treasurer of the Blackstone Valley Gas & Electric Company.

E. W. Weathers, electrical engineer of San Diego, has announced his appointment as San Diego representative of the Blackstone Engineers. Mr. Weathers for some years owned the Weathers Motor Shop, selling that business not long ago to enter private practice as consulting engineer.

F. O. Broili, Nevada Machine & Electric Company, Reno, Nev., visited San Francisco recently in the capacity of consulting engineer for the Elko municipal water system and the Mineral Company power system.

C. N. Stannard, vice-president and general manager, Public Service Company of Colorado; **W. C. Sterne,** general manager, Municipal Properties Investing Company; **A. C. Cornell,** Rocky Mountain manager, Western Electric Company; and **D. D. Sturgeon,** prominent Denver electragist, were among the electrical men who attended the recent division convention of the Rotary Club at Colorado Springs.

A. E. Vieau, Crouse-Hinds Company, Minneapolis, was a recent visitor in Salt Lake City.

P. E. Matteson, sales manager, Intermountain Electric Company, Salt Lake City, recently visited the Pacific Coast, spending some time in both Los Angeles and San Francisco.

W. S. Vivian, director of public relations of the Middle West Utilities Company of Chicago, was the principal speaker at the weekly luncheon of the Salt Lake City Rotary Club held recently in that city.

John W. Hubbard, of Hubbard & Company, Pittsburgh, was a recent visitor in California.

A. H. Wyman, former manager of the Salt Lake City branch of the Allis-Chalmers Manufacturing Company, is now manager of the Cleveland branch. **H. E. Weiss,** formerly service engineer of the company in Chicago, succeeds Mr. Wyman.

G. F. Kinkaid of the Idaho Power Company, Boise, was a recent visitor in Salt Lake City.

H. D. Brown and **F. N. Murphy,** electrical engineers, are in charge of the motion picture electrical pageant to feature Shrine week, which will be held in Los Angeles in June.

D. S. Jones, Center, Colo., a former member of the Colorado legislature and politically active for a number of years in Republican circles, has been appointed by Governor C. J. Morley as a member of the Colorado Public Utilities Commission, succeeding **Grant Halderman,** whose term expired last January. **F. P. Lannon** of Pueblo, Colo., has been named chairman of the commission.

Thomas Duncan, president, Duncan Meter Company, Lafayette, Ind., at a recent meeting of the San Diego Electric Club, gave an interesting account of his engineering experiences on a trip through Africa from Cairo to Cape Town. **A. F. Blecksmith,** representative of the Duncan Meter Company in Los Angeles, accompanied Mr. Duncan from Los Angeles.

A. L. Clarke, formerly in the radio service of coastwise and foreign shipping as radio operator, recently has taken over the business of the Electric Lighting Supply Company, 4000 Piedmont Avenue, Oakland, formerly owned by B. R. Fritz. Mr. Clarke will conduct an exclusive electric appliance and supply shop and specialize in radio.

S. I. Weill, until recently general accounting superintendent of the installation department of the Western Electric Company, New York, has been appointed assistant to the vice-president of that company in charge of the telephone department. Mr. Weill studied electrical engineering at the University of California, Berkeley, and entered the employ of the Pacific Telephone & Telegraph Company in 1909 to engage in engineering work at San Francisco. He went subsequently to Portland where he occupied a number of important posts related to construction and plant. In 1917 he was back in San Francisco on the staff of the general superintendent of plant, and was then transferred to the American Telephone & Telegraph Company as accountant in New York. He went overseas as first lieutenant in the signal corps with the 317th Field

S. I. WEILL

Signal Battalion and was later district signal officer, advance section. On his return he rejoined the American Telephone & Telegraph Company, but in 1923 he left to become general accounting superintendent of the installation department of the Western Electric Company. Mr. Weill's home is in Maplewood. He is a member of the Braidburn Country Club and chairman of its membership committee.

G. I. Drennan, for many years traveling inspector for the Pacific Power & Light Company, with headquarters at Walla Walla., Wash., has been promoted to be field superintendent. The scope of his duties has been enlarged to include jurisdiction over certain phases of employee relations, particularly with reference to accident-prevention work.

A. F. Morairty, district manager of the Public Service Company of Colorado with headquarters at Alamosa, Colo., has been promoted to the position of assistant to V. L. Board, general superintendent of the company at Denver, succeeding E. H. Coe, who has become manager of the Central Arizona Light & Power Company, Phoenix, an Electric Bond & Share property. Mr. Morairty recently was elected to the presidency of the Colorado State Association of Chambers of Commerce following his designation as head of the Alamosa County Chamber of Commerce. Along with these offices he also holds that of secretary of the Rotary Club in Alamosa, troop committeeman in the Boy Scouts, member of the advisory board of the Order of De Molay and is chairman of social and community welfare work in his home city. He is also active in N.E.L.A. work and Shrine activities. He is a native Coloradoan having been born at Boulder, Dec. 27, 1888. He attended the grade and high schools in Denver and later received his E.E. degree at the University of Michigan. His first position was with the Colorado Power Company, predecessor of the Public Service Company, in plant construction work, and then by successive stages he became a substation operator, steam plant operator, system dispatcher, assistant local manager, then local manager at Leadville, Colo., and finally manager of the San Luis valley district of the company. Mr. Morairty is a great believer in civic and community building especially from the utility viewpoint, as evidenced by his participation in experimental projects which will lead to the

A. F. MORAIRTY

building of the first beet sugar plant in his section of the state and an ice plant for the refrigeration of certain vegetable crops, especially head lettuce. Since he became manager of the San Luis valley territory three years ago Mr. Morairty has extended the service of his company to seven new towns, one of which formerly had a municipal plant, and has secured a 20-year franchise in each.

G. G. Caldwell has joined the San Francisco Bay region sales staff of Moe-Bridges Company. Mr. Caldwell will devote his time to calling on the dealers in that territory.

William Mulholland, Los Angeles, and **C. E. Grunsky,** San Francisco, consulting engineers, recently were authorized by the directors of the Sacramento Utility District to review the report on the Silver Creek project made by Albert Givan, city manager, and submit a joint report of their findings.

H. B. Squires, of H. B. Squires Company, San Francisco, Pacific Coast representative of the Cutler-Hammer Manufacturing Company, recently attended a conference at the latter's plant in Milwaukee, Wis.

A. D. Blanchard, formerly af the engineering department of Charles Cory & Sons, Inc., New York, is now a member of the industrial sales staff of that organization.

J. J. Mullin, vice-president, Maloney Transformer Company, St. Louis, was a recent visitor on the Pacific Coast, spending some time in Los Angeles and San Francisco.

D. M. Shreeve, for some time assistant to the manager of the Sandpoint, Idaho, division of the Mountain States Power Company, Albany, Ore., has been promoted to be manager at Sandpoint, taking the place of **Lee Bennett,** recently transferred to Corvallis, Ore., as local manager.

H. B. May recently was introduced to the electrical fraternity of San Diego by **E. M. Ellis,** as the new General Electric Company representative and resident agent for San Diego.

K. E. Van Kuran, district manager of the Los Angeles division, Westinghouse Electric & Manufacturing Company with his family and **Ralph Hopkins,** were visitors to San Diego early in the month.

L. E. Stiers, Stiers Electric Company, Compton, Calif., was a recent visitor in San Francisco.

J. D. Kent, formerly salesman in the Colgate division of the Pacific Gas and Electric Company with headquarters at Marysville, Calif., has been appointed division sales manager of the company in West Side division with headquarters at Red Bluff, Calif.

R. L. Ward, civil engineer formerly in the construction department of the Southern California Edison Company, Los Angeles, is now in charge of the storm drain department at the Wilmington branch of the Los Angeles city engineer's office.

J. H. Spraggon, formerly with the Westinghouse Electric & Manufacturing Company, has joined the sales staff of the Electric Service Supplies Company, Philadelphia.

J. G. Miller, since 1921 engineer in the valuation department of the Southern California Edison Company, Los Angeles, has been appointed power engineer for the American Trona Corporation, Trona, Calif., in charge of steam generation, refrigeration, and generation and distribution of electric power. The American Trona Corporation is one of the largest manufacturers of potash, borax and other similar chemicals in the United States. These chemicals are obtained from the brine of Searles Lake. After graduation from Sibley College of Engineering, Cornell University, in 1914, Mr. Miller was for three years field engineer for the late L. L. Nunn of the Telluride Power Company, in the investigation, valuation and purchase of engineering properties. During the war Mr. Miller was in charge of instruction at the training school of the United States Signal Corps, after which he received valuable experience as office engineer and assistant purchasing agent with the Texas Construction Company, an Electric Bond & Share property. He spent nine months in the same organization

J. G. MILLER

on the construction of the Leon River steam generating plant of the Oil Belt Power Company of Texas. On completion of this plant several months were spent in placing it into operation and in building up the plant efficiency. In 1921 he joined the force of the Southern California Edison Company.

Obituary

M. R. Bump, since 1910 chief engineer of Henry L. Doherty & Company, in charge of all engineering and of the construction and operating departments of the public utility division, died in Denver, May 5, after an illness of two days. Mr. Bump was born at Rock Falls, Wis., March 18, 1881. He received his early education in the schools of Spokane, Wash., and was graduated in electrical engineering from the University of Wisconsin when he was twenty-one, immediately taking up engineering work with The Washington Water Power Company of Spokane. He joined the Doherty organization in 1904. Among the positions he has held were: instructor in electrical engineering at the University of Wisconsin; first cadet engineer of the Doherty training schools; engineer for the gas department of the Denver Gas & Electric Light Company; examining engineer for the Doherty company; and treasurer and general manager of the Empire District Electric Company, Joplin, Mo. At the time of his death he was vice-president of the Cities Service Company, which controls the Public Service Company of Colorado. Mr. Bump was president of the National Electric Light Association for the term 1921-1922.

TRADE NOTES

Decker Electrical Construction Company, San Francisco, recently has moved into its new quarters. A lease has been signed on a two-story concrete building on Bryant Street, between Third and Fourth Streets, that will give much needed additional office and warehouse facilities to take care of its rapidly expanding contracting business. Peter Decker, head of the company, states that more business is booked and in sight at the present time than has been the case at any similar period for years past.

The Okonite Company, Passaic, N. Y., has established recently a branch office at 221 Stock Exchange Building, Los Angeles. E. C. Wescott, formerly general sales manager of the Marbelite Corporation of America, has been appointed district manager of the Los Angeles office.

Westinghouse Electric & Manufacturing Company, Pittsburgh, now has on the market a complete line of structural pipe fittings, designed for use with common wrought iron or steel pipe in the erection of outdoor or indoor electrical switching equipment.

General Electric Company, Schenectady, has announced the development of a new type of synchronous motor for direct drive of slow-speed reciprocating compressors which have their greatest application in furnishing compressed air or artificial refrigeration.

Fullerton Distributing Company, Los Angeles, recently has been formed by J. B. Fullerton to sell the National Cleaner, a new washing machine, which will be manufactured by the Apex Electrical Distributing Company, Cleveland.

A. H. Holtermann, formerly of Holtermann's Electric Shop, 89 Market Street, San Francisco, has taken over the line of electric fans and toys of the Knapp Electric Corporation, New York, and will act as its exclusive representative on the Pacific Coast for the states of California, Washington, Oregon and Nevada. He also will represent the Arnold Electric Company, Racine, Wis., in California, handling its line of vibrators and hair dryers.

The Newport Contracting & Engineering Company, Newport News, Va., has been awarded the contract for an extension to the power plant at Bremerton, Wash., for which $90,197 has been appropriated.

The United States Electric Company, 710 Polk Street, San Francisco, has started manufacturing electrodes, for violet-ray machines. W. L. Wilson is proprietor of the company, which is operating as manufacturers' agent and wholesaler of electrical specialties.

Pass & Seymour, Inc., Syracuse, N. Y., recently has placed a new device on the market known as the P & S 3316 canopy switch, a new pull chain canopy switch which it is stated has an exceptionally smooth easy action.

Automatic Electric Heater Company, Warren, Pa., recently has placed on the market a new and approved electric temperature regulator which has been designed particularly for use with domestic coal or oil-burning furnaces.

F. W. Wakefield Brass Company, Vermilion, Ohio, manufacturers of "Red Spot" lighting specialties, has issued a new series of condensed data sheets on its entire line.

The Karl Andren Company, 250 Congress Street, Boston, recently has been appointed distributors for Robbins & Myers motors for New England territory.

Jones-Thorne & Company, Inc., San Francisco, has recently opened new and enlarged offices in the Chancery Building, 564 Market Street. They are representatives in that city of Fort Pitt Spring & Manufacturing Company, and A. W. Cadman Manufacturing Company, Pittsburgh, and of R. D. Wood Company and Cook Cedar Company, Philadelphia.

D. D. Sturgeon, electragist, Rotarian, vice-chairman of the Denver Electrical Cooperative League and member of 'most everything else, needs no introduction. He is one of the "go-getters" who are electrifying everything in Denver and vicinity.

Gainaday Electric Company, Pittsburgh, recently has announced a new washing machine, which it is claimed contains many attractive new features.

P. A. Geier Company, Cleveland, manufacturers of Royal electric vacuum cleaners, recently held its annual convention at its factory in Cleveland, sales, advertising, clerical, manufacturing and administration departments participating in the event.

Jewell Electric Instrument Company, Chicago, has issued recently an attractively bound and profusely illustrated booklet containing extensive information concerning its varied line of instruments.

Square D Company, Detroit, has purchased recently an addition to its main plant at Detroit, which enlarges the floor space twenty-five per cent, thereby giving better production facilities.

The Buckeye-Prima Company, Sidney, Ohio, recently has placed a new device on the market for use of tourist camps in equipping their barbecue stands with a driving mechanism, and has issued an illustrated booklet descriptive of this new device. Another booklet of interest describes the Prima Never Crush safety wringer, which it is stated has many advantageous new features.

Commercial Engineering Laboratories, Inc., Pittsburgh, Pa., recently has introduced a new product called the X-C. E.L. foot switch that it is placing on the market. It is a device adaptable for automobile horns, stop light and directional signals, call bells and electric locks. Made of heavy rust-proof metal, it is claimed to be practically indestructible.

R. L. Barker & Company, Chicago has issued a new pamphlet describing its new model "E" Barker sander and grinder, for which are claimed many interesting features.

The Newbery Electric Corporation, 726 S. Olive Street, Los Angeles, has been appointed agent for the Electro-Kold Corporation, Spokane, manufacturers of the Electro-Kold electric home refrigerator. This agency is to cover the Los Angeles territory for the product of the Spokane concern.

Plibrico Jointless Firebrick Company, Chicago, recently has issued a new edition of its catalog containing 36 pages, well illustrated and descriptive of its furnace linings. Free copies may be obtained by addressing the company's office at 1130 Clay Street, Chicago.

Kingsbury Machine Works, Philadelphia, represented in San Francisco by the Western Engineering Company, Matson Building, recently has issued a descriptive bulletin of Kingsbury thrust bearings, dimensions, capacities and mountings. The bulletin contains many drawings and photographs depicting new types of appliances.

W. A. Jones Foundry & Machine Company, Chicago, recently has developed the Lemley Model "F" friction clutch to meet the demand for a medium and light-duty clutch which it is stated can be applied conveniently to practically any machine or countershaft which requires a friction clutch.

Johns-Pratt Company, Hartford, Conn., has developed a new type of trough for connecting adjacent Noark service entrance switches. It is claimed the use of these troughs provides a most convenient and inexpensive method of wiring together the adjacent cabinets and materially reduces the amount of labor involved.

The Demmert Company, which represents the Cutter Electric & Manufacturing Company, Sundh Electric Company, and the Jenkins Manufacturing Company, has opened offices at 405 Call Building, San Francisco, in charge of I. M. Chinn. The company for some time has had offices in Los Angeles where Otto Demmert is personally in charge.

The Albert Sechrist Manufacturing Company, Denver, recently has opened offices in Salt Lake City at 214 Judge Building under the supervision of R. C. Shrake. Business of the Intermountain region will be handled through this office.